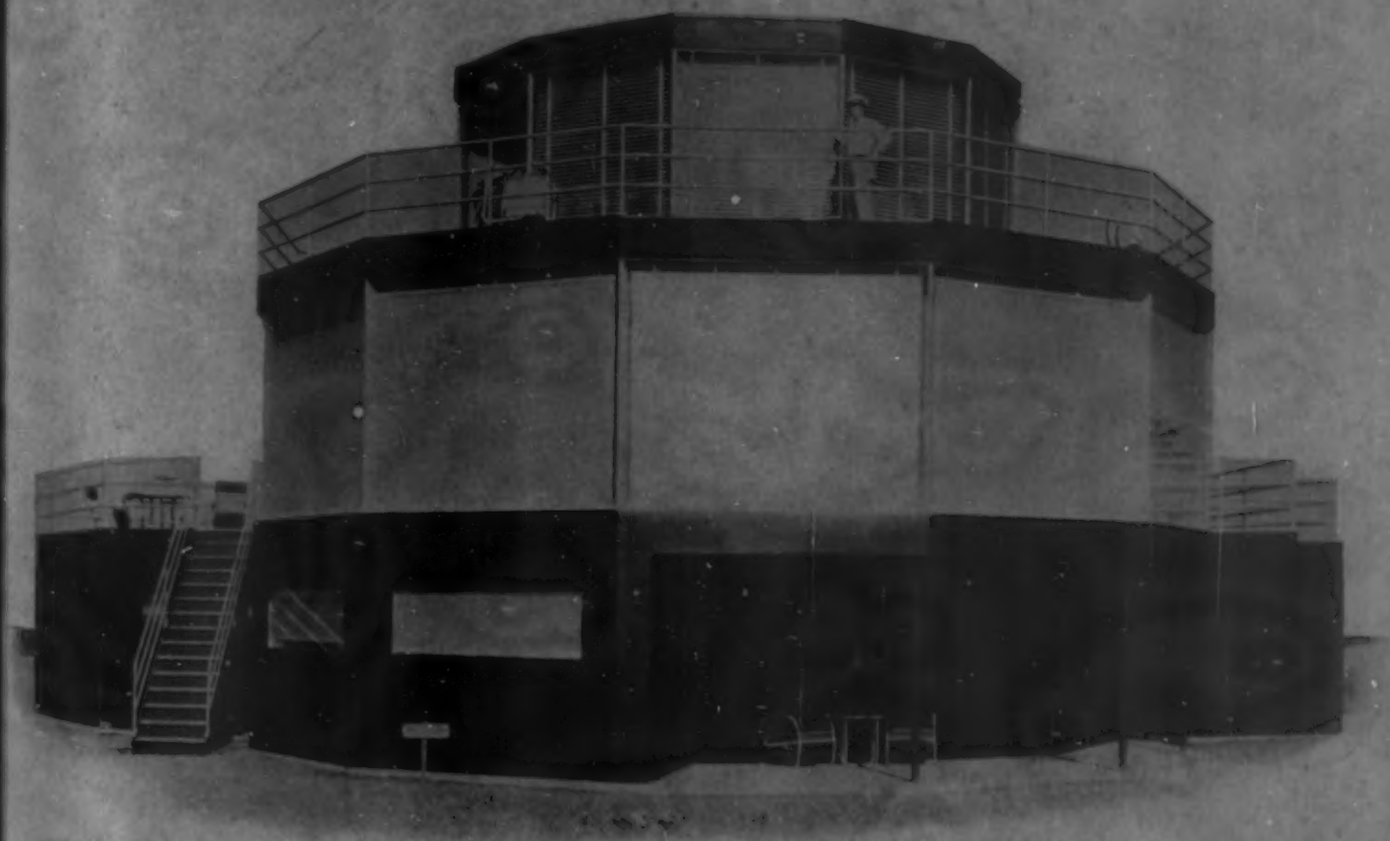
Volume IX

Number 6

Plastic Products



AUGUST

In This Issue: Plastic Coatings at the World's Fair — Costing for Molding — Benzyl Cellulose Compositions.

DUREZ PRIMER

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Durez treated paper opens up many new fields for laminated materials, e. g.: table tops, mop boards, chair back, trays, etc.

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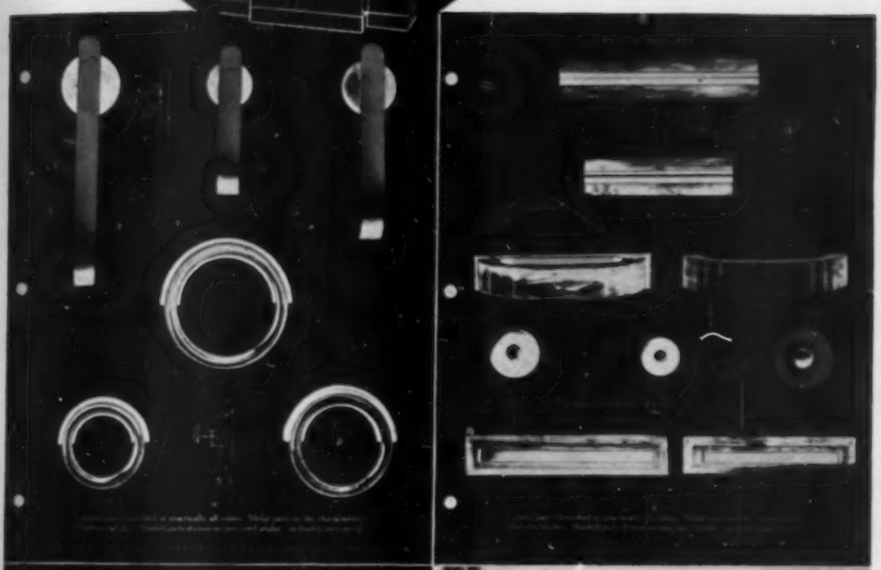

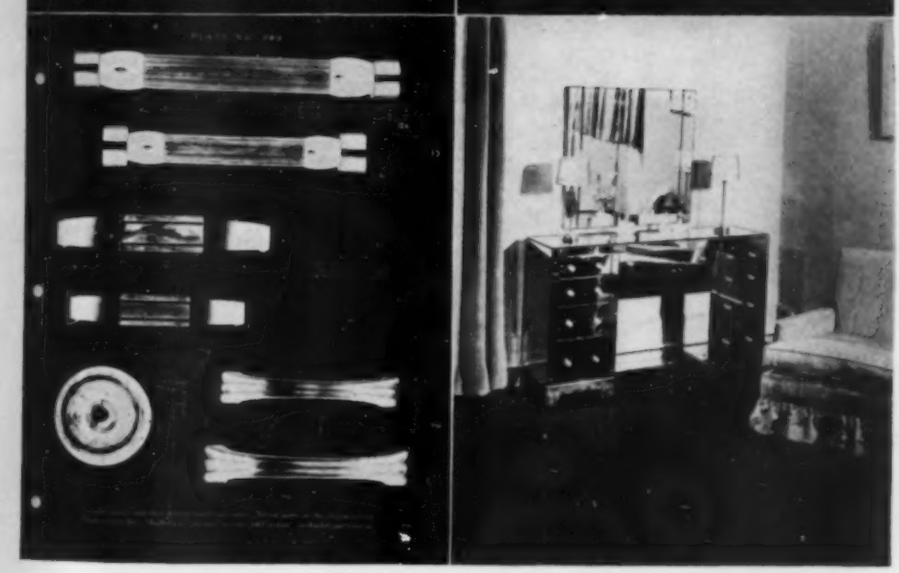

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Plastic Products

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PLASTIC PRODUCTS is published monthly by Plastic Publications, Inc. Williams Haynes, *Chairman of the Board*; R. C. Gilmore, Jr., *President*; Robert C. Gilmore, *Vice-President*; Malcolm H. Frost, *Secretary*; William F. George, *Treasurer*. Published on the first day of each month at Pittsfield, Mass., and printed for the publishers by the Sun Printing Company. Entered as second class matter at the Post Office at Pittsfield, Mass., under the act of March 3, 1879. Subscription rates: Domestic, two dollars, in advance; Canadian, three dollars, fifty cents, and Foreign, three dollars a year; single copies current issue, twenty-five cents each, back issues, fifty cents each. Notice of three weeks is necessary to change subscriber's address. Kindly give both the old and new addresses. Editorial and Advertising offices, 25 Spruce Street, New York, N. Y.

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Plastic Products

VOLUME IX NUMBER 6

Costs and Costing

ONE of the immediate effects of the National Recovery Act will be to impress the importance of adequate cost records upon a great many business executives who have not in the past felt that these details were a matter for their personal attention. When business was generally profitable costs were more or less left to shift for themselves. During the past couple of years prices have been commonly made upon the strictly competitive basis of what would take the business. Under either system knowledge of costs has not seemed vital information for the management to have in complete and accurate detail, and cost finding has come to be considered more or less of a luxury which the smaller business enterprise could hardly afford.

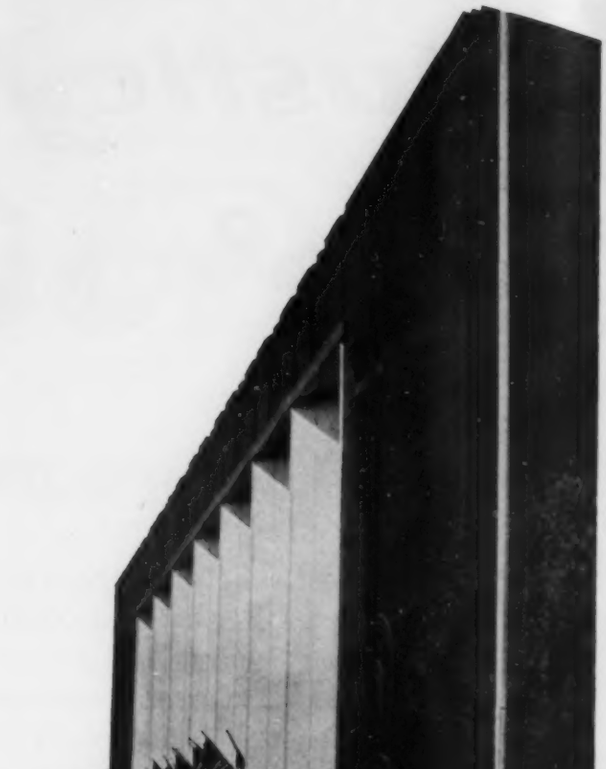
And all this in the face of the bankruptcy records which have for many years shown plainly that "a knowledge of costs is the beginning of business wisdom."

Now an accurate and practical method of costing has become a necessity. Most of the industrial codes provide for some means of defining fair competition in the terms of selling below cost. Many of them specifically require uniform cost accounting. Even the signers of the President's blanket code have agreed not to raise prices "by more than is necessary, by actual increases in production, replacement, or invoice costs of merchandise."

The cost problem can no longer be laughed away or ignored. An answer must be found for every type of business and that answer must be correct. It cannot be faked by hope nor fudged by deceit. The problem is not any easier to solve today than it ever was. It is as complex and as confounding as ever. But today it must be solved unless an industry is willing to have its costs determined arbitrarily and by compulsion. Fortunately, in most of the various branches of the plastics group of industries, costs can be determined accurately and general formulas for costing can be drawn up that are broad enough to cover even the complications of molding equipment and the ramifications of coating by-products.

Synthetic Coatings at the Century of Progress

By Charles E. Fawkes
Pyroxylin Products, Inc.

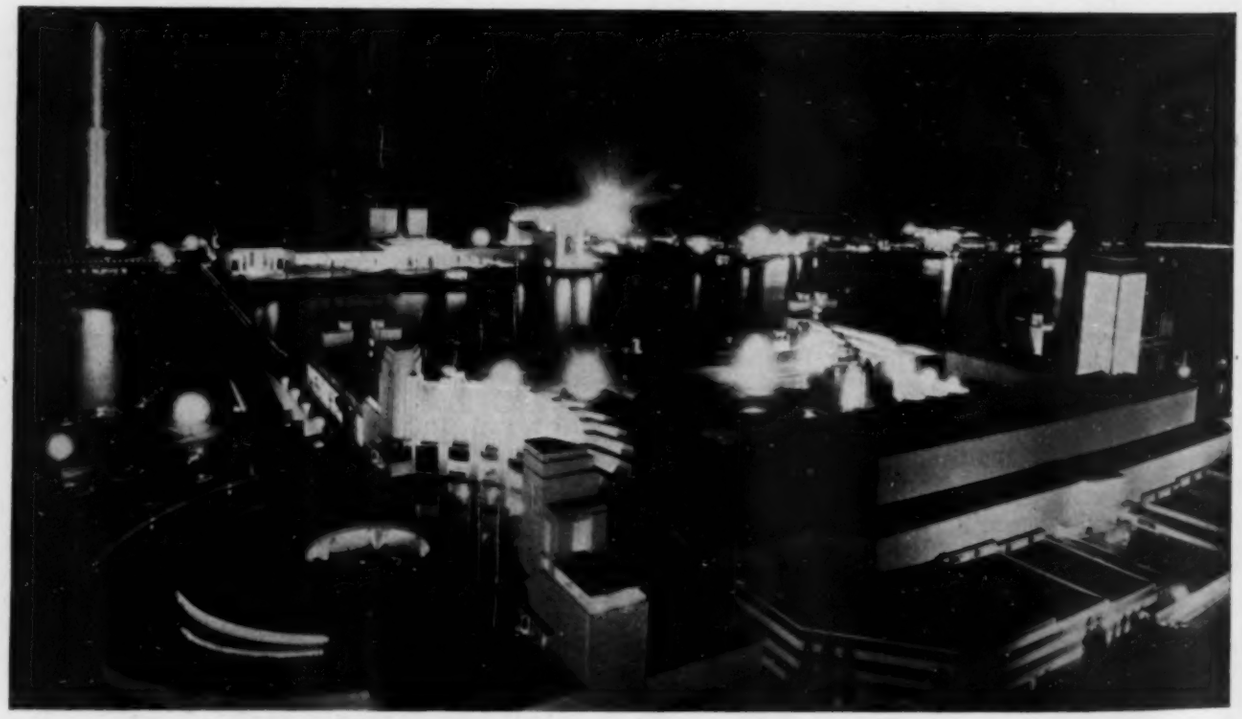


MILLIONS of words have been printed on "whether the colors at the 1933 Fair connote the new vogue or are just vulgar," which if placed end to end, etc., etc., would reach, etc. etc.

The plastics chemist and the paint technologist, however, are intensely interested in the paint job at the fair for several reasons.

First, new and unfamiliar base structural materials have been painted.

Second, a new visual effect has been secured in paint, which may become the "style."



The cement-asbestos exterior of the Administration Building at top of page is done in casein paint. Most of the experiments with paints were carried out on this building. Below, effectiveness of flat, lustreless paints illuminated with concealed light sources is illustrated by this photograph of the fair at night.

Third, this is the largest outdoor casein paint job ever undertaken.

Fourth, a variety of methods have been used to try to make casein paints weather properly. This fair will give important data in this connection.

Fifth, flat oleoresinous paints and flat lacquers have been used interchangeably with outdoor casein paints.

Sixth, relative performance of these materials will affect future formulation of outdoor decorative paints.

The present fair is in complete contrast to the first Chicago fair as far as colors and coatings are concerned. The Columbian Exposition in 1893 was in the classic style. It depended for its visual effectiveness on the use of classic Doric and Ionian, on arch, frieze, and bas-relief. And since the ancient originals were largely white marble, the imitation structures of 1893 could be sprayed with nothing more profound than whitewash and the result was satisfying.

Coatings at the 1933 fair are somewhat creatures of necessity. Much has been written about inventors in attics, after months of sleepless nights, discovering the only paint that would do. Much secrecy is supposed to surround the formulation of the paint which the Century of Progress selected for use on its own buildings. As a matter of fact the fair had tested and had available for use, many paints technically equivalent. Furthermore, the concessionaires used on their own private structures paint and lacquers from many sources. Thus actually, the various fair buildings have representative lustreless exterior coatings of many sorts from many important manufacturers. Flat oleoresinous paints have been extensively used and finally among the most interesting technically, lustreless plastic cellulose ester lacquers applied by brush on immense vertical surfaces without laps or sags.

This article is not written with any interest in the fair itself, but rather to acquaint protective coating technicians with some details of the application so they may better value correctly the results.

Early in the development of the fair, it became evident that the paints would have to conceal immense differences in planeness and smoothness of the exterior surfaces. Furthermore, these structural materials presented novel problems in free alkali, paper sizing, veneer glue, etc. For example, at the time the Administration Building and Travel and Transport Building were constructed, the only available cement-asbestos board was so alkaline that an oleoresinous paint would "burn" within thirty days after application. At that time, two years ago, it was thought that nothing could be more difficult than the particular paint problems presented by these first two buildings to be erected.

Mayan Temple showing application of casein paint upon forms including mostly carved wood and plaster. This job now shows considerable failure in the form of "Wet Spots" in the paint.

But the worst was yet to come. As the depression got a firmer grip, it became necessary continually to lower the construction costs of fair buildings by substituting continually cheaper exterior structural materials. Thus, as time went on the paint problem changed from cement-asbestos board to metal sheathed veneer, then to plywood, finally to paper surfaced plaster board; the last being a material on which there was no history or experience whatever to guide in selection of outside protective and decorative coatings.

Flat oleoresinous paints have been used on the exterior of the lower portions of the General Motors Building. The tower is done in casein paints.

The final complication came in the form of the late Joseph Urban's color scheme. This scheme must need work under both daylight and artificial light. The illumination is the work of D'Arcy Ryan, J. L. McConnell, E. B. Tilson, and Clarence Farrier. They pointed out that Urban's color effects would depend on finding paints which were lustreless—they not only didn't care if the paints chalked—they insisted on absolute chalkiness to begin with. Thus the unknown performance of lustreless and discontinuous film paints was superimposed upon the unknown base materials upon which such paints had to be applied.

The reason for this insistance upon lustrelessness may not be apparent. For many reasons, which have been given wide publicity, the construction motif at the fair is the ultra modern. Furthermore, the modern motif depends greatly for its effectiveness upon form, light, and color,—particularly light and color.

In fact, in this architecture, light and color are considered to be part of the fundamental structural design. They serve, it is said, as substitutes for the detailed intricacies of the classical form. They are a part of the building. The monotony of large areas and surfaces, great towers, is relieved with color—color from two sources—the paint itself and the illuminant. Then, the monotony of the expanse of the color itself is relieved by differences in intensity contrast with the color environment, and by variation as to quantity and spacing. That is, by this theory, the inornate tower of the Hall of Science would be oppressive except that each side of this tower is a different color. This new decorative tool is thus theoretically the replacement of physical detail with color variations of hue, saturation, and brightness.

When one depends on color for architectural effect, it is presumed that the color shall, under as many conditions of observation as possible, look like the color it is supposed to be. Thus the necessity for lustrelessness.

For proof, imagine the opposite. Suppose that "ordinary" oil paint or enamel were used on a tower. It will dry to a hard glossy colored surface. But such a surface reflects light specularly, and the specular portion reflected will partake of the character of the illuminating source. Furthermore, the amount of specular reflection will not be constant, but will depend greatly upon the position of the illuminant and that of the observer. This is tragic to the ultra modern. It means that if you have a tower in red and green and you illuminate it with green,—then at certain angles, the red will look green—or if you use white light, both green and red areas at certain angles, will look white. It is alleged that nothing could be worse than this.

On the other hand, if this same tower is done in lustreless paint, then no matter where the observer stands or whether the white light illuminator is direct sunlight, or diffused skylight, or artificial light at grazing incidence—the green is green and the red is red.

And while the reference is fresh, a word about building illumination with hidden illuminants, light projection at grazing incidence. The paint chemist who sees the fair will go for that! He will take lustreless paints as a future probability for this reason alone. One look at the fair buildings at night is conclusive to anyone with any artistic sensitivity. This is the way to illuminate!

But the plastics chemist is interested primarily in the following questions:

1. What troubles were encountered in the application of these paints and how were they applied?
2. What did the jobs look like when done?
3. What are the normal and special destructive influences at work on these paints?
4. How are the paints standing up?
5. What condition will they present for repainting?
6. What coverage was secured?

The Oriental Village is constructed largely of wood and paper surfaced plaster board. It has been coated with casein paints.

7. What does such painting cost?

The fair is almost all two-coat work. Paint on the exteriors of the majority of the fair buildings is largely so-called washable exterior casein water paint. The paints of this class most widely used were pigmented drying oil emulsions with casein, although some casein-resin emulsions were applied in a small way. In all probability a dozen different manufacturing sources are represented by this class.

Where flat oleoresinous paints and enamels have been used, the probable type of oil or resin or synthetic is just a matter of guessing. In at least one case, this type of paint was selected because casein paints would not dry to water insolubility fast enough during intermittant rains in early May.

In addition to these casein paints, many of the private concession building exteriors were decorated with lacquers which were formulated to give complete diffuse reflection. Selection of this type of finish in place of casein paint in many cases depended on a desire to get a finish which could be washed or scrubbed during the progress of the fair, and which would not, after such treatment look water spotted, crack, or have that typical "washed out" look.

Interiors have been treated with kalsomine, flat paint, lime casein paints, and lacquers. Lacquer has been frequently used in corridors and on walls below the dado line to get satisfactory washability.

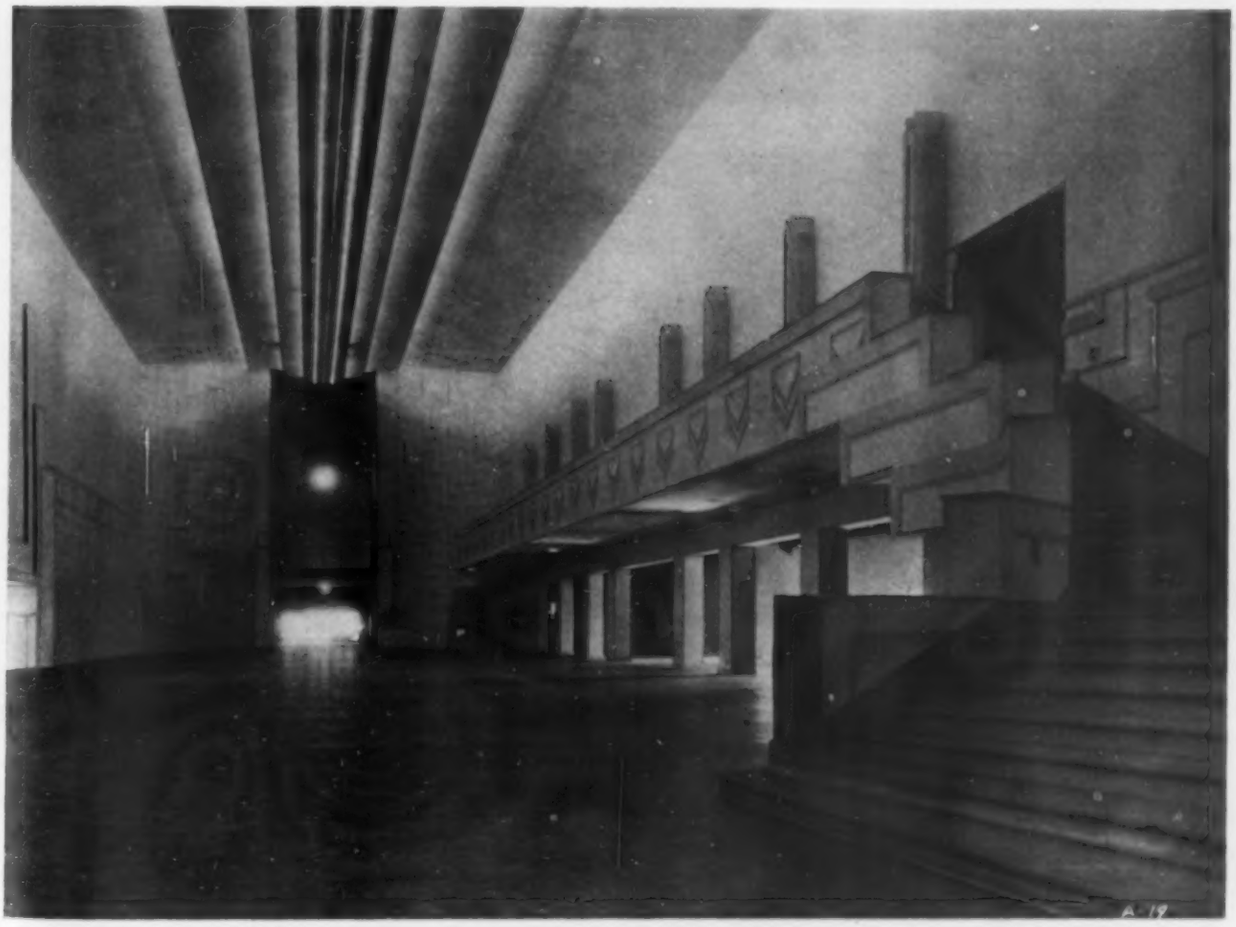
The fair is also an extensive test field for many of the newly available pigments. Cadmium yellows, oranges, and reds have been used extensively. Because the fair is adjacent to the Illinois Central Railroad shops, the use of lead pigments has been avoided on account of their tendency to blacken in sulfur fumes. Thus whites at the fair are largely sulfides and oxides, lithopones and titanium oxide. The brilliant non-fading greens and blue greens are oxides and hydrates of chromium; blue color schemes have been built up from ultramarine as a base. Cadmium and cobalt greens have been used extensively.

It will be interesting to see on this application just how fade proof some of these new pigments are in these comparatively new vehicles, at least for the life of the film which carries them. In the case of the lacquer finished surfaces, this will probably compare favorably with the best types of oil paints, and enamels. Chalking, however, will probably be the type of failure encountered, and data will be secured as to how seriously this failure affects appearance and condition for repainting.

The speed of application of paint at the fair was little short of miraculous. On March 1, 1933, there was not one single building or concession which had its finished coat of paint. In the ensuing sixty-three working days, it rained 28 days. Nevertheless, on the opening day every official fair building had its final paint coat and every concession scheduled for opening day was completely decorated.

In order to secure many thousands of small subscriptions to the Century of Progress Exposition, the fair company enlisted, back in 1926, the assistance of the Chicago Federation of Labor. One condition imposed by the labor group was that the union rules should be adhered to when the work went into erection. The result was that no paint spray equipment could be used in applying paints at this fair. As a result, lacquers and synthetic resin paints of the fast drying types were out of the question.

The principal difficulties in applying casein paints arose out of the slowness with which they became sufficiently waterproof to withstand rain. Forty-eight hours seemed to be the critical time required by even the fastest of them. Time after time, 24 to 36 hours after the casein was brushed on, a rain storm would completely wash off the portion which had not had a full 48 hours of



Great Hall of the Hall of Science shows the result obtained by the use of illumination at grazing incidence upon lustreless casein paint.

perfectly dry weather to set up. Fog from Lake Michigan complicated the matter still further.

The flat paints in most cases stood rain 24 hours after application satisfactorily, while brushing lacquers gave no trouble after four or five hours.

The journeyman painter "beefed" considerably on the difficulty of thinning some of the casein paints. Some varieties came to the job as a heavy paste and great difficulty was experienced in thinning these down to brushing consistency with cold water, no hot water being available.

By far the greatest difficulty in application was "lap marks." More explicitly the casein paints show definite differences in gloss and color at joints between areas painted at different times. Surprising as it may seem, little difficulty was encountered with lap marks on the brushing lacquer jobs. Here some difficulty arose from the tendency of the succeeding lacquer coats to soften the coats already applied. When the painters were instructed not to prolong the brushing out of lacquers this difficulty largely disappeared.

As to finished appearance, the entire effect is certainly arresting. Critical inspection, however, discloses the "lap marks" as the most noticeable flaw in the appearance of the finished paint job. This could have been avoided, of course, by the use of spray paint methods and is not a fair indictment of lustreless exterior paints. Incidentally, these laps are somehow less visible under artificial light than in daylight.

Next to lap marks, in noticeable defects in appearance in the casein paints is "wetness." This is a poor term and is meant to describe a visual change in the color lustre of the paint due to it becoming saturated with water from base on which it is applied. The Mayan Temple shows this badly on certain plaster and wood sections of the exterior.

The casein paints, furthermore, show considerable checking into large cracks where they have applied heavy oleoresinous primers (factory applied) on some of the structural materials. This is particularly true of the black casein as on the Social Science building.

The lacquer material and the flat oil paints show faulty appearance in places where sufficient cleanliness was not exercised. Differences in gloss are visible over putty spots, where, in the hurry, blocking out with shellac or size was forgotten. The organic solvents in these paints and lacquers have rendered them more prone to capillary absorption on such structural materials as plaster board, pressed wood, etc.

It must not be judged from the foregoing, that the general appearance of any of these paints is bad. These remarks are directed at the specific defects in appearance unnoticeable except by close critical examination.

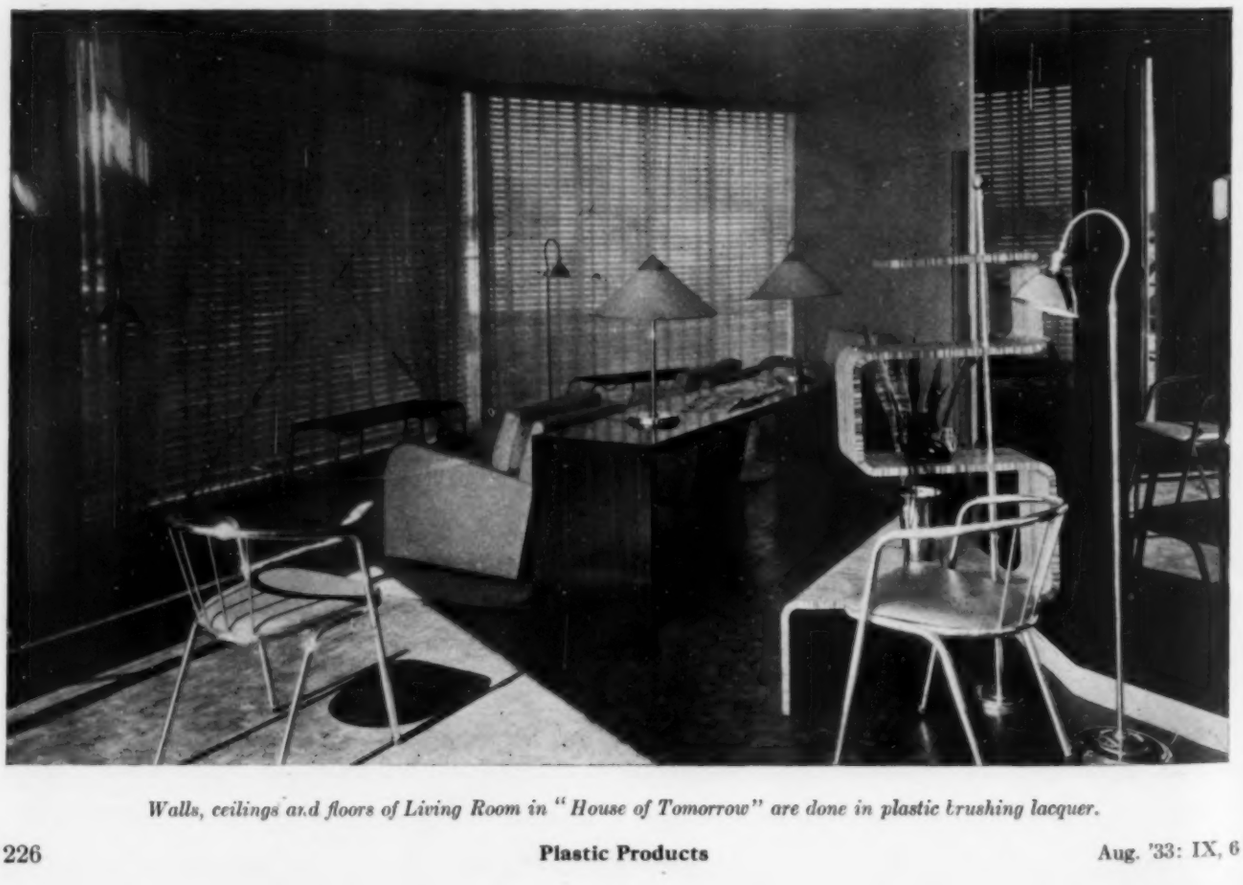
The Century of Progress decorative coatings are in actual use. From 75,000 to 250,000 people per day are scraping their elbows on them, wiping their feet on them; the Illinois Contral shops are gassing them with sulfur dioxide; Lake Michigan is drenching them in humidity; they have just gone through one of the hottest Junes in Chicago history and they were pelted by a terrific hail storm early in the morning of July 2nd. How are these strong coatings behaving?

The casein paints are showing some rust spotting over rail heads, bolts, etc. on the light colors. There is also some slight "crocking" where dark saturated colors have drained across light colors after rain storms or vice versa. The lap marks in the brushing seem to be less pronounced as time goes on. The light fastness and general brilliance of the colors so far is excellent.

The casein paints and flat oleoresinous paints show decidedly more dirt than the lacquer jobs. Where washing has been done this difference is quite pronounced. All floor finishes of whatever nature are failing under the traffic, by simple abrasion.

In general it may be said that at the end of the first sixty days exposure, the appearance of all classes of paint is good. It is too early, however, to say what condition of surface will be presented for repainting when failure has proceeded further.

The coverage on all of the paints was quite normal. Some casein paint jobs claimed as high as 700 square feet per gallon and some lacquer was as low as 350 square feet. The paint materials were supplied at prices ranging from very low to very high. Some green casein paints, using the chromium and cobalt pigments were supplied as high as $8.00 per gallon. Lacquers, on the other



Walls, ceilings and floors of Living Room in "House of Tomorrow" are done in plastic brushing lacquer.

hand, which have the reputation of high price, were supplied at prices at all times comparable with casein paint and oil paint, and in some cases a substantially lower price. Records available to this author show that painting costs with all three classes of material ran between $.02 and $.04 per square foot, of which 60% was labor at $1.41 per hour.

Finally, of what consequence these lustreless paints will be in the future is problematical. They are proven by this large application at the fair to be perfectly practical. Millions of people have already seen them and this may create interest and demand.

Thousands of people going home from the fair will try to reproduce these interior and exterior color effects in homes, institutions, schools, offices, etc. They will discover at once that success depends on securing lustreless paints—and immediately the paint technician is involved.

At this stage of the game, the author will hazard a guess that, on the plywood structures the flat oleoresinous paints will be found, on November 1st when wrecking starts, to be in the best condition. At present it looks as though the casein paints will be "dirtiest." On sheet metal, casein already seems to have the best of it for adherence. The same is true on cement—asbestos board, although where a casein primer has been used on this structural material followed by brushing lacquer, a combined adherence, cleanliness, and washability of a high order has resulted. Long before the fair opened oleoresinous paints were rejected as unsuitable for cement.

Readers of *Plastic Products* are naturally most interested in the lacquer performance. Brushing architectural lacquers are now developed to a point where the average painter can apply them with excellent results. Properly pigmented, such lacquers are alkali proof, wash like a dish, and even in these flat lustres, do not get a "washed look" as does flat paint. Furthermore, they can be prepared in all of the saturated colors required for the brilliant harmonies of these modern decorative schemes.

The "speed" factor must not be overlooked. Due to delays beyond the control of the painter, the benches for the spectators at the A & P Carnival had to be painted in the last few hours before the fair officially opened. Brushing lacquer was used and the benches went into service with the management holding its breath. There was no claim for soiled clothing!

In new structures of the future the relation between lighting effect and decorative finishes will be the concern of the architect. By conference between the paint and lighting experts, the architects will be enabled to secure the necessary coordination to secure the desired result.

It may be expected, furthermore, that in old buildings, the term "modernization" will include such structural changes as are required to permit introducing light at grazing incidence upon the walls and ceilings decorated with lustreless washable finishes.

Importance of Celluloid in Industry

THE manufacture of celluloid is a relatively simple process. Nitrocellulose is kneaded together with camphor, and the resulting substance is stained. According to Will and Dubowitz, commercial celluloid (camphor celluloid) consists roughly of 50-70 per cent. nitrocellulose with a nitrogen content of 10-11 per cent., 15-35 per cent. camphor, and 0.15 per cent. added substances—filling, coloring and softening materials—which alter the properties of the celluloid in different ways according to the purpose in view. Other analyses have shown the added substances to account for from 25 to 50 per cent. of the total weight. For softening materials (plasticizers) use is made of vegetable oils (e. g., castor oil), glycerine compounds, tricresyl phosphate, etc. The commonest filling materials are gelatine, gum arabic, train oil, borax, alumina and zinc white. The methods of mixing these substances are mostly preserved as trade secrets, since the properties of the finished goods depend on them to a high degree.

Formerly, the camphor used was exclusively the natural camphor obtained from Japan, China and Formosa, a distillation product of volatile camphor oil. It is a white, crystalline, friable substance, very soluble in ether, alcohol, and certain other liquids, but quite insoluble in water. It melts at 177° C., but volatilizes at ordinary temperatures. At the present time synthetic camphor is also obtained from American oil of turpentine, and this variety is now used almost exclusively in Germany. Several attempts have been made to replace camphor entirely by other and cheaper substances, and, incidentally, to lessen the characteristic camphor odor of celluloid; but of the countless patents taken out for this purpose, very few have been actually worked. Among the substitutes proposed are said to be chloral hydrate, urea compounds and chlorinated hydrocarbons. Crude celluloid is amorphous, transparent, very strong, elastic, hard and very light (specific gravity about 1.4). Like horn, it is unbreakable, and very tough. It possesses a fine, slightly shiny surface. When uncolored, and without additions, it is seldom employed; transparent celluloid is mainly used for safety glass in protective screens on motor-cars and other vehicles.

Many articles in general use are made entirely of celluloid. Celluloid is also worked in combination with other raw materials, sometimes as the preponderant component, and sometimes forming only an insignificant part of the finished article. Such use is exemplified by celluloid handles for umbrellas and sticks, celluloid buttons and fastenings on clothes and shoes, celluloid parts of electrical apparatus, celluloid coverings on boxes, mirrors, ornaments, tooth and other brushes, spectacle frames, writing materials, piano keys, and many other articles, not excluding the celluloid tips of shoe laces. There is probably no line of business in which goods with celluloid parts are not to be found.

Useful Properties Offset by Serious Defects

The useful properties of celluloid, which are responsible for its wide and varied distribution, are unfortunately offset by serious defects. It ignites very easily and burns with a very smoky flame. One kilogram generates from 3,500 to 4,500 calories and, according to Bonwitt, the combustion temperature may reach 1,500-1,700° C. Particularly dangerous are the loose scrap, shavings and dust produced in working-up processes. Once alight celluloid burns with extraordinary rapidity, particularly in large quantities. In America 850 kg. of celluloid film was consumed in three minutes in a testing chamber, and 32,000 lb. in a Massachusetts warehouse in sixteen minutes. During a big fire in Germany, about 50,000 kg. was consumed in an hour; and in another, about 10,000 kg. in half an hour.

Celluloid does not ignite or explode spontaneously, nor can it be made to burn by mechanical action, such as friction, shock or impact. But certain varieties can undergo flameless decomposition at temperatures above 100° C., in the heat radiated by steam and other heating systems for example; or by continued exposure to a powerful electric lamp. The resistance depends upon the composition, more particularly the proportions of filling and coloring substances. In such case combustion is accompanied by clouds of inflammable camphor fumes, oxides of nitrogen, carbon monoxide and prussic acid, all of which are very poisonous and usually arise in such quantities that all the air in the premises is speedily forced out. Thus, if suitable measures are not taken, the dangers to which industrial workers, the neighborhood of undertakings, and the general public are exposed in the manufacture and working of celluloid have been shown to lie in (a) the high inflammability of the celluloid and its raw materials; (b) the ease with which celluloid is decomposed by radiated heat, poisonous and in some cases explosive gases and vapor being generated; (c) the explosibility of nitrocellulose when dry; (d) the danger of ignition and explosion of the solvents; and (e) the noxious effects of any vapors and solvents inhaled.

In order to eliminate these dangers as far as possible, many factory and warehouse regulations have been drawn up by the Governments of all countries manufacturing celluloid. This information is given in a publication issued by the International Labor office.

Benzyl Cellulose Moulding Compositions

Benzyl cellulose. Properties which characterize and commend benzyl cellulose are its chemical stability, its low hygroscopicity, its excellent electrical properties and its relative non-inflammability. It can be used as the base from which to prepare molding materials, celluloid, films, various coating dopes, insulating compositions, lacquers and enamels, weatherproof linoleum, plastics, etc. Its stability permits of the manufacture of coatings, molding compositions, etc., which have good resistance to acids and alkalies, and which do not discolor on exposure to ultra-violet light. Different grades of benzyl cellulose meet many applications which this material now has in the technical field.

Various types of molding compositions can be made from benzyl cellulose. These compositions may be varied in rigidity and flexibility, in specific gravity and to some extent in properties—such as resistance to corrosion under special conditions. The specific gravity of benzyl cellulose itself is 1.2. The specific gravity of molding compositions varies from 1.2 to 2.0, according to the composition and according to the purpose for which it has been prepared.

Molding compositions made from it have low hygroscopicities. Molding powders, which were dried in vacuo, and then exposed to an atmosphere of 72 per cent. saturation at 20° C., showed a gain in weight of 0.4 to 1 per cent. after 48 hours. When moldings made from benzyl cellulose compositions are exposed in a moist atmosphere of 100 per cent. saturation a slight gain in weight takes place.

Transparent moldings made from benzyl cellulose have remained visibly unattacked after 15 months' immersion in various strengths—10 per cent. by volume (sp. gr. 1.098) 20 per cent., 30 per cent., 40 per cent. and 60 per cent. (sp. gr. 1.588) of sulfuric acid at room temperature. Strips made from the various benzyl cellulose molding compositions have remained visibly unattacked after 8 weeks' immersion in sulfuric acid, up to a specific gravity of 1.4. These moldings are similarly unattacked by 5 per cent. hydrochloric acid and 5 per cent. acetic acid. Benzyl cellulose molding compositions also resist caustic soda solutions of 1 to 40 per cent. strength at room temperature.

Molding thermoplastic materials like benzyl cellulose and its compositions can be carried out in two main ways. In injection molding the material is heated to a suitably plastic state and is squirted under very high pressure into a cold mold; here one of the essential features of injection molding is that the mold is dealing with applied pressures exerting their force from the inside, tending to open the mold. In compression molding, the material is heated in a mold and pressed to shape when sufficiently plastic; here the pressure is exerted from the outside and tends to close the mold.

Injection molding lends itself to very high speed production and has this advantage over compression molding that the material comes into contact with inserts when it is still in the plastic state. This feature enables one to deal with inserts which would be too delicate to withstand compression molding, where the pressure is applied before a suitably plastic state has been reached. For small articles, multiple impression molds, containing a number of cavities, can be filled in one operation lasting 15 to 20 seconds. The essential part of injection molding, as practiced with thermoplastics of the type of benzyl cellulose, is injection into cold molds. When the material is inside the mold under a pressure on the ram of some 8 to 10 tons per square inch, and the pressure released, the article can be removed instantly. Three, four and five or even more injections per minute are thus possible.

The pressure required to make benzyl cellulose compositions flow at their working temperature is ½ to 1 ton per sq. in. The compression mold is heated first to about 110° C., and is then filled with the requisite quantity of molding powder. Cooling can then usually be started though the right moment to apply it is a matter of experience with the particular mold, and the pressure is gradually applied until the maximum of about 1 ton per sq. in. is reached. The mold may be opened when the temperature has fallen to a degree at which the mold can be handled. Temperature varies somewhat, depending on the type of mold and the ease of flow which curved and inclined surfaces make possible, but the usual limits are between 100-120° C.

The common aromatic solvents such as benzol, toluol, and xylol are not by themselves solvents for benzyl cellulose, but have a swelling or gelatinizing effect. When, however, 10-20 per cent. (by volume) of alcohol is added to the mixture it is an excellent solvent for benzyl cellulose. The best method of making a benzyl cellulose solution is to wet the granular benzyl cellulose with alcohol and then to add the aromatic solvent. The solution may be made up in any of the usual types of stirring, shaking or tumbling apparatus commonly used in paint manufacture. For the preparation of very viscous solutions or dopes, say, 30-40 per cent. solutions of benzyl cellulose, an apparatus of the Werner Pfleiderer mixer type is most suitable. In such cases the solvent should be added gradually, a portion being added first and thorough mixing being continued until a dough is formed. The remainder should be added gradually to prevent the formation of lumps.

Aliphatic hydrocarbons are non-solvents for benzyl cellulose and even when mixed with alcohol have no solvent action. Some solutions, however, may tolerate the addition of quantities up to 50 per cent. of aliphatic hydrocarbons.

Aliphatic alcohols are non-solvents, but the lower numbers of the series have the property of conferring solvent power on some of the hydrocarbons and chloro-compounds. Aromatic alcohols such as benzyl alcohol are solvents for benzyl cellulose. Aromatic ethers, and mixed ethers containing an aromatic group, are solvents. Methyl cellosolve (the methyl ether or ethylene glycol), and 1:4 dioxane are solvents. The ethers of glycerol are solvents for benzyl cellulose. Ketones are non-solvents, but the addition of 20 per cent. -50 per cent. of benzene sometimes confers solubility, e. g. acetone-benzene (50:50 by volume) is a good solvent mixture. The esters of the lower fatty acids up to the amyl ester possess a certain solvent action which is improved by the addition of 20 per cent. of benzene or toluene: e. g. ethyl acetate-benzene (80:20 by volume) is a good solvent mixture.—*Abstracted from Chemical Age.*

COSTING for MOLDING

By George K. Scribner
Boonton Molding Co.

The passage of the National Recovery Act will certainly do one thing—make all industries "cost conscious." Its references to selling below cost and its direct raising of the basic costs of raw materials and labor bring the cost system to the front as never before.

The depression itself should have done something to raise the question of costs. To a certain extent it did by forcing every corporation to cut all superfluous expenses; but the accurate recording of the remaining expenses was lost in the frantic struggle for enough business to justify a direct labor payroll. Now a standard is to be set up, permitted by the law of the land, by which "Costs" are to be gauged.

The first thing to be decided is, of course, the rate of output on which all standards are to be based. If our volume is cut to 20% of our total capacity we cannot expect to make money, nor can we expect to make sales if we use existing overheads. Every corporation arbitrarily sets a volume output at which they will break even and then uses the overhead so established in their quotations.

Assuming such an arbitrary volume, however, there are many ways of arriving at the sales price, very few of which give a safe picture for the variety of constantly changing products going through a molding shop, although each one would work individually if the same group of parts were constant in their flow through all departments.

Determination of Sales Prices

The three most common ways of arriving at sales prices are somewhat as follows:

1. Material at cost, labor plus a percentage, (sometimes a different percentage on finishing and molding, sometimes a blanket percentage on both), plus a percentage of the whole for profit.

2. A minimum return for each unit per day or shift after all direct charges such as molding and finishing labor and material are paid.

3. Material at warehouse cost, labor of molding, press time at cost rate per hour, finishing labor and overhead based on several varying rates depending on the operation, plus a definite per cent. of the selling price to cover so-called Sales and Administration expense, plus a percentage of the selling price as profit.

The last system is by far the most accurate, especially if the figures are based on an average of the preceding twelve months, always discarding the thirteenth month as a new one is added.

The basic idea is to divide the factory into as many shops, or divisions, as there are distinct kinds of processing equipment. Each division is charged with expenses—rent of floor-space, power, supplies, etc.—according to its use of each. Process-time is then charged to manufacturing orders at rates which will, under normal operating conditions, cause the product of each division to absorb all of its expenses. The normal rate is also used for estimating on new products.

Thus a press pays for its steam, hydraulic power, air, floor space, gaskets, depreciation, insurance and what have you, with the natural result that it is truly found that it costs 80c per hour to operate the press whether the operator earns 25c or 70c. It will be found also, that a variety of presses will cost a variety of hourly rates, which is entirely logical.

The same holds true in the finishing department. Each basic group of operations have different overhead rates per hour which are entirely independent of the wages paid the operator. It clearly costs more per hour to operate a five horse power belt sander with a dust collecting system attached than a small bench drill, or for a man to sit at a bench and hand file pieces. Yet the average shop will bulk its finishing overhead as one percentage on all labor without regard to wages per hour and be satisfied. They disregard, among other things, the fact that an expert, fast hand filer who is paid 55c per hour, under those conditions, is figured to cost them more money to house and supervise than a clumsy beginner trying to do the same job for 25c per hour.

Under such a system there will always be a group of expenses that have no logical relation through horsepower, floor space, equipment investment, or other means of distribution to any of the internal factories. This group of expenses is commonly called Sales and Administration expense. A better and truer name would be "Un-allocatable Expense." This can be isolated each month as a percentage of the sales—not of the factory cost.

The profit also should be a percentage of the sales so that when the factory cost is arrived at it is divided by a factor such as .78 if 12% S & A and 10% profit is desired.

The difficulty with the systems numbered one and two above is that they tend to bring in business having an excess proportion of finishing due to its lack of covering burden. A molder using those methods will be much surprised to watch the growth of his finishing department and annoyed at the upset in his monthly costs.

In any system the material costs have to be watched carefully to eliminate leakage. Raw molding compound costs from five to 10 per cent. over the invoice charge when it is laid down in the factory for use. If it is pilled, a definite rate per pound or per thousand pieces must be added to this figure, the first being preferable. The weight actually charged into a mold should go

on the cost card—not the finished weight of the piece—figured at 105 to 110 per cent. of the price per pound.

With the rising percentage of material in the sales dollar, due to the use of larger molds with the corresponding reduction in the molding labor, a small discrepancy in the cost of the material applied to a specific job can tear a big hole in the monthly balance sheet.

So many molders cannot logically connect in their minds the relationship of the monthly balance sheet and the individual cost card. A classic example occurred some time ago when two molders argued about their respective overheads. One insisted he had only 100%, claimed a smaller shop and obviously less expense involved. This molder said he didn't have a job in the shop that did not show a profit. Three weeks after this argument that molder gave up the ghost—his creditors stepped in. He had looked at steady losses in the operation of the shop as a whole and wondered how it could be when he knew that every piece showed a profit—at his assumed overhead of 100%.

It is so easy to look at the figures covering a nice order and accept the price offered because although it doesn't figure out right on your overhead system still after you have paid out $8,000.00 for material and direct labor there will be $2,000.00 left toward your overhead which you would not have if you did not yield to the temptation. You know $4,000.00 is the right figure but—

If any one can drive into the heads of the molding trade in general that overhead is actual outlay, as truly as is labor or material, and that any job that does not bring in the full factory cost as the absolute permissible minimum is taking cold cash right out of the bank, that person would solve the molding industries problems at one stroke.

Every stroke of a press unit uses expensive gaskets, swivel joints, oil, water under high pressure, and many more items that cost money. Indirect man power is applied, steam is used, insurance is required, many items go on the books because that press is running. These things do not show up directly but they sap the bank account just the same.

New Oil-Resisting Materials

Mention has previously been made of new products designed to resist practically all solvents, oils and fats, such as Ethanite, a reaction product of ethylene dichloride and calcium polysulfide, and Thickol, a polymethylene polysulfide. Although different claims may be made for the individual products now on the market, in general these polysulfides may be vulcanized in a similar manner to rubber requiring no sulfur, but zinc oxide in proportions of one to twenty per cent. is necessary; the material in appearance is similar to rubber, being homogeneous and pliable, but the gravity is much higher, viz., 1.6. The suitable vulcanizing temperatures are similar to those with rubber mixings, such as one hour at forty pounds steam pressure. The addition of rubber is not necessary, although milling is facilitated thereby. In the case of Ethanite it is stated that the addition of five per cent. of rubber gives a product which is as resistant to oil as Ethanite alone, but generally speaking, the oil resistance deteriorates according to the amount of rubber present. Carbon black may be added to increase tensile strength and decrease porosity, and a mix which is stated to be resistant to practically all oils and solvents is:—Ethanite 20, pale crepe 1, zinc oxide 2, carbon black 5.

When cured these products show practically no dimensional increase when immersed in such solvents as benzol, toluol, and carbon tetrachloride, and acids, with the exception of strong nitric or chromic acids, are without action. A 20 per cent. caustic soda solution or concentrated ammonia attacks the material, but the latter does not appear to suffer from aging in the usual manner of rubber goods. The particular advantages obtained are offset to some extent by the objectionable characteristic odor which, besides rendering the use of the products impracticable in many instances, for example foodstuffs, renders the general atmosphere where it is in process, particularly in the region of the mill, decidedly unpleasant. Possibly means will be found of overcoming this, at any rate to a considerable extent.—*British Plastics.*

Oxides of Iron and Their Use in Molded Plastics

By J. W. Ayers
Director, Research, C. K. Williams and Company

Practically all of the iron oxide colors can be used in the decoration of molded plastic articles. However, only a limited number of these pigments have been adopted commercially—they are various shades of burnt turkey umbers, burnt siennas, the deeper shades of pure Indian red, black oxide of iron, and limited quantities of ochre and pure yellow oxide. Browns and blacks predominate in molded plastic compositions.

The commercial names of the typical browns, such as seal brown, mahogany, red-brown, etc. mean very little, as each manufacturer has a distinct shade of his own, although the terminology of different companies may be quite similar.

A few formulae will help to illustrate the types of colors used to arrive at shades produced generally on a commercial scale.

Mahoganies

Burnt Sienna	2.92
Black Oxide of Iron	.44
Deep Indian Red	.64
Resin	49.
Wood Flour	49.
Burnt Sienna, Dark	.8
Burnt Sienna, very Dark	3.12
Black Oxide of Iron	.08
Resin	49.
Wood Flour	49.
Burnt Sienna	1.64
Black Oxide of Iron	.14
Deep Indian Red	.22
Resin	49.
Wood Flour	49.

Seal Browns

Burnt Sienna, Dark	1.85
Black Oxide of Iron	.1
Ultramarine Blue	.05
Resin	49.
Wood Flour	49.
Deep Indian Red	.75
Burnt Turkey Umber	1.75
Resin	49.
Wood Flour	49.

Red-Browns

Deep Indian Red	1.75
Burnt Turkey Umber	.75
Resin	49.
Wood Flour	49.
Deep Indian Red	1.50
Black Oxide of Iron	.5
Resin	49.
Wood Flour	49.

Blacks

Nigrosine Dye	1.4
Black Oxide of Iron	.6
Resin	49.
Wood Flour	49.

Olive Drab

Black Oxide of Iron	1.9
Yellow Oxide of Iron	.1
Resin	49.
Wood Flour	49.

Modern Plastics

A New—Old Industry

By Archie J. Weith and A. V. H. Mory*
Bakelite Corp.

THE Plastic Art is as old as the potter and his clay, but in recent years certain materials, largely organic and synthetic, which are made plastic by heating or by the aid of a solvent, and which may be molded or pressed directly and rather expeditiously into more or less finished forms, or fabricated by machining from solidified stock materials, have been referred to as "Modern Plastics." They have come into being, or into greatly increased use as plastics, during the period covered by the life of the American Institute of Chemical Engineers.

At the time the Institute was being organized the manufacture of the pyroxylin plastics was an old established industry. But though celluloid had long been a household word and an important plastic material, an increasing need for technical improvement of its manufacturing processes was beginning to be felt. The development of cellulose acetate plastics received a great impetus at about this time through Miles' discovery that by a process of "ripening" the primary acetate could be stabilized and made soluble in an inexpensive solvent. Casein plastics had been on the market abroad under the trade name, Galalith, less than a decade. A time-honored member of the plastics group, shellac, had previously found use in the new electrical industry as molded insulation and was now finding still larger use as the important ingredient of phonograph records. Bituminous plastics, originated abroad, were just being introduced here by Hemming who coined the term "cold-molding" to describe one method of fabricating them.

At about the same time phenol-formaldehyde condensation products were being studied by Baekeland who was first seeking a substitute for shellac, then selling for a dollar or more a pound. When, in 1909, he announced and patented, under the trade mark, Bakelite, a synthetic resin of a new order of industrial usefulness, research in the whole field of synthetic plastics was greatly stimulated. Since then patents have flowed increasingly from all industrial countries. Thus one by one, in addition to the phenolic plastics, have come the amino-plastics, prepared from thiourea-formaldehyde or urea-formaldehyde resin, of which Beetle was the first commercial representative; the alkyd plastics prepared from polybasic acids and polyhydric alcohols, and commercially designated Glyptal plastics; vinyl plastics, prepared from polymerized vinyl esters and marketed as Vinylite; and styrol plastics, prepared from polymerized styrol (aromatic derivative of vinyl), and marketed as Victron—to name a few of the newer plastic materials that have acquired, or give promise of acquiring, industrial importance.

Pyroxylin, a low-nitrated cellulose, was successfully plasticized in 1869 by John W. Hyatt assisted by his brother, Isaiah S. Hyatt. Earlier experimenters had employed liquid solvents which were wholly or in part volatile and which on being driven off gave flexible, but non-plastic or poorly plastic final products. Hyatt employed a solid solvent, camphor, in connection with a small amount of alcohol, which was afterward expelled by slow drying, or "curing." The camphor remained to provide a thermoplastic mass. Hyatt was thorough in his work and established an industry that went on with no revolutionary change until the beginning of the period covered by this survey.

John H. Stevens, associated with the Hyatts from the beginning, carried on as leading technologist. He was known in his day as the dean of the industry. It was Stevens who introduced the wheel for making continuous film, and also the use of amyl acetate as a solvent in the preparation of Celluloid coatings. As these lines are being written, news comes of Stevens' death in his eightieth year, still a consultant to the industry. Later came William G. Lindsey, who contributed much to the art as director of research for the Celluloid Corp.

Writing in the first number of *Plastics* magazine, E. G. Loomis, mechanical engineer, tells how he and Jasper E. Crane, works chemist and later manager of the old Arlington Co. (now Du Pont Viscoloid Co.) worked together in introducing mechanical handling of materials. They mechanized nitration, acid extraction, and "drowning." They developed alcohol dehydration, a great improvement over the old system of centrifuging, and absorbing residual water with blotting paper. They introduced mechanically driven bladed mixers with provision for solvent recovery, and built a large press for filtering the plastic mass, in the latter case following and improving on German practice.

Later developments of importance were the Du Pont dipper system, devised during the late War, a marked-improvement over the mechanical nitration, acid extraction, and drowning systems mentioned above. There have been many other contributions made by the technicians of the four largest companies now making pyroxylin plastics in this country: Celluloid Corp., Du Pont Viscoloid Co., Fiberloid Corp., and Nixon Nitration Works. Apparently, the most important of these developments was that of greatly increasing the stability of the pyroxylin employed. This was brought about by an acid boiling or hydrolysis purification process by which are removed all but insignificant traces of acid and of sulfuric esters, the presence of which contributes greatly to the instability of the nitrated product.

Pyroxylin plastics are characterized by extreme toughness at ordinary temperatures and a workable plasticity under moderate heat. Any color or shade from "water white" to opaque black may be produced. They have long been employed in the production of toilet articles and novelties. Fabrication is by machining or by hot-pressing, or molding, from sheet, rod, or tube stock. The number of different applications of Celluloid, Pyralin, Viscoloid, Fiberloid, Xylonite—to mention important trade names in the field—is said to have reached 25,000.

Pyroxylin plastics have found their most important industrial application as the material of photographic film and as the middle layer of shatter-proof glass. They tend slowly to discolor with exposure to sunlight, and when the film is used for motion picture projection, or for large-scale X-ray photography, the flammability which characterizes even the modern, relatively stable product becomes a distinct hazard. Search for a more light-stable and less flammable ester of cellulose than the nitrate, led to the development of the acetate.[1]

The development of cellulose acetate plastics encountered certain inherent difficulties. As early as 1894 Cross and Bevan patented a process for making the acetate, but the process was slow and gave a product that was soluble in only expensive solvents, mainly chloroform. Also the resulting product was one that rapidly became brittle. What started cellulose acetate plastics on the way to industrial success was the discovery, in 1906, by G. W. Miles, an American, that the primary acetate, the so-called triacetate, could be transformed by a simple process of "ripening" into a secondary product of increased stability and of ready solubility in an inexpensive, non-toxic solvent, notably acetone. It remained for the brothers, Camille and Henry Dreyfus, to give the process industrial significance by working out optimum conditions for the employment of the acetylating

Abstracted from "Twenty-Five Years of Chemical Engineering Progress."—Amer. Inst. of Chem. Engineers.

agents, acetic anhydride, acetic acid, and sulfuric acid. This work, begun in Switzerland in 1911, was given practical application during the War, both here and abroad, in the production of "dope" for airplane wings. The Dreyfus brothers' earlier efforts were in the field of synthetic fiber, but to them appears also to belong most of the credit for the commercial production of cellulose acetate plastics in the form of sheets, films, and molding powders. Cellulose acetate plastics provide non-flammability and greater stability to sunlight, but at the expense of the extreme toughness that characterizes the pyroxylin products. Like the pyroxylin plastics their possibilities by way of color effects are unlimited.

An interesting development is that of a film of the acetate reinforced with wire cloth and commercially known as Vimlite. Millions of feet of this product are said annually to find their way into poultry houses, greenhouses, and hospitals because of its transparency to ultra violet light. Cellulose acetate plastics are coming into use in the production of film for X-ray and light photography, and for motion picture projection. Also being more stable to light than the pyroxylin products, they are finding increasing use in the production of shatter-proof glass.

Casein Plastics

E. E. Childs of Brooklyn, New York, took out a German patent in 1885 covering a process for making plastic masses from milk curd, but apparently did not develop his process commercially. A decade or more later Adolph Spilleler in Germany produced a horn-like product which led to commercial production by an allied German-French company styled the Internationale Galalith Gesellschaft Hoff & Co. Their trade name, Galalith, has stuck to the product with well-nigh generic significance. The principal producer of casein plastics in this country is the American Plastic Corp.

Casein plastic, which is essentially milk curd hardened with formaldehyde, has never achieved large industrial importance. Its defects are a low degree of plasticity and a relatively high water absorption. It is not unlike horn in that it is very tough, burns with difficulty, and softens slightly on heating, but only enough to form the simplest shapes by bending, punching, or pressing. It may be produced in light colors, however, and does not darken with age. It is easily machined or ground into any form desired, and takes an excellent polish. It has been largely employed as a material for buttons and for other uses in which toughness and decorative effects are most important. Although the material itself has not been greatly improved since the beginning, there has been much progress in the method of manufacture. The most important innovation appears to have been the dry process which employs rennet casein, instead of acid casein as in the earlier, wet process. The dry process is said to be shorter and cheaper and to give a tougher product.

"Alkyd" is a term coined to cover, generically, the products obtained by esterifying polyhydric alcohols and polybasic acids. Such products were first described in 1901 by Watson Smith[2]. Alkyd resins were first developed industrially by the research laboratories of the General Electric Co. and given the trade name, Glyptal.

The largest present use of alkyd resins is in the field of protective coatings. In the laboratories of the Bakelite Corp. alkyd resin products have been developed as plastic masses to be machined into pencil barrels, and other forms of utility and decoration. More recently there have been developed alkyd dental resins, which when hot-molded possess great strength and toughness along with permanent colorings closely approximating those of the oral tissues. A new development is "Permacrome," prepared by superimposing a hardened alkyd plastic onto laminated products. Also the last few years have seen the development of rapid, free-cutting grinding wheels in which alkyd resins of the heat-convertible, i. e., the heat-hardening type, because of their toughness and resiliency, serve effectively as bonding agents.

The univalent radical, CH_2:CH, of which ethylene is the hydride, is called "vinyl." The double linkage of the vinyl radical (CH_2:CH) favors the polymerization of its esters with the formation of resins. These resinous polymers have long been known, but it has remained for the research staff of the Carbide & Carbon Chemicals Corp., to develop certain of them during the past five years into products of commercial value.

A vinyl derivative, phenyl ethylene (C_6H_5.CH:CH_2) is called styrol. We are told by Scheiber and Sandig that "the phenyl group adjoining the ethylene linkage increases the tendency to polymerize to an exceptional degree." The tendency of styrol to polymerize has long been known, but the control of this tendency with the production of polymers of commercial value has been the work, during the past several years, of Willis R. Gibbons, M. G. Shepard, and O. H. Smith of the General Laboratories of the United States Rubber Co. Before their work no method was known by which styrol could be produced at a reasonable cost or by which it could be polymerized so as to give with certainty a resin having valuable physical properties.

"The first problem was to make styrol cheaply. Preliminary work pointed to ethyl benzene as the most promising 'intermediate,' although at the time it was available only in small quantities and was expensive. The problem therefore became first that of producing ethyl benzene cheaply. This was accomplished. For the cheap production of styrol from ethyl benzene various materials were found, sulfur and sulfur compounds in particular, which influenced the dehydrating process favorably, and by the use of these materials, accompanied by rigid temperature control, a method was finally developed which appears to be satisfactory from a practical point of view.

"Formerly polymerized styrol, long known as 'meta styrol' was obtained as a gum, as a strong, tough resin, or as a brittle resin, depending on the molecular weight attained, and this had never been controlled. It was discovered at the General Laboratories that the quality of meta styrol could be controlled satisfactorily by controlling the concentration of styrol in solution and the temperature of polymerization. Further refinements in the method of polymerization were initiated subsequently and it is now possible to produce styrol of uniformly high quality."[3]

Shellac

"Shellac's thermoplastic properties were early recognized and employed to some extent. Large-scale use of shellac as a plastic began in the late nineties when Berliner adopted it as the material best suited for the production of his disc phonograph records. About the same time another Edison invention, the incandescent electric lamp and the generating and distributing systems for light and power that sprang from it, were turning for their insulation from porcelain to something less brittle. Hard rubber first served, but with a rise in price, shellac as well as bituminous compositions began to be used in a large way. As insulation, shellac compositions were molded; also coil forms prepared from paper rolls coated with shellac varnish were employed.

"Phonograph records were prepared by T. H. MacDonald in 1908 by sandwiching a much cheaper material between two shellac-coated sheets of paper. But for years shellac blended with fine mineral or other filler has been the principal material employed.

"The toughness and strength of shellac early led to its use as a bonding agent in grinding wheel manufacture, in lamp basing, and in preparing laminated mica products, but the heat-hardening plastics have replaced shellac in the two first-named and in many other uses calling for high heat-resistance.

"We speak of shellac as a thermoplastic material,and so it is for all practical purposes, but its fusion point rises substantially with rising temperature and prolonged heating. Aylsworth and Edison, in 1915 and Daniels and Snell, in 1924 raised the fusion point by chemical treatment."[4]

Under bituminous plastics we should include (following Abraham, in his "Asphalts and Allied Substances") plastic materials prepared from "native bitumens, pyrobitumens, pyrogenous distillates (pyrogenous waxes and tars) and pyrogenous

residues (pyrogenous pitches and asphalts)"—in other words, most of the materials we know, both native and pyrogenous, which in their unrefined state are black and thermoplastic.

The plastic use of native bitumen, or asphalt, is very old. Abraham tells us there exists a heraldic device dating back to 2850 B. C., which is cast in an artificial composition of clay and asphalt. Pyrogenous bituminous products, on the other hand, date from the latter part of the seventeenth century and were not made on a large scale until a hundred years later.

"Of the utilization of bituminous substances in plastic compositions, there is little record in patent literature. Unlike the synthetic resin plastics, each fabricator has always made his own molding materials and has preferred secrecy as his protection. With the probable exception of road building, which would appear to be without the purview of this brief survey, hot-plastic bituminous compositions find their greatest single use in the production of storage boxes. Formerly wooden boxes lined with a molded rubber cell were used. Then came a box all of hard rubber. This was later replaced by a much cheaper and equally serviceable box molded from a bituminous mixture the exact comparison of which is best known to the makers. In general such mixtures appear to consist of a bituminous base of suitable flow when hot and of suitable rigidity when cold filled with a siliceous mineral, such as diatomaceous earth, and asbestos or vegetable fiber to give added strength.

"Of chief historical interest, though of decreasing industrial importance, are the cold-molded bituminous plastics. These were first made in Germany, under the trade name "Gummon" and were introduced here in 1908 by Emile Hemming. In the cold-molded art asbestos is wet with a solution of the bituminous bonding agent and the solvent, which is volatile, is allowed to evaporate until the mass has attained the consistency desired for cold molding. The pressed forms are baked to drive off the residual solvent and further to harden the bonding agent.

"Cold-molded bituminous plastics slightly anti-dated the heat-hardening phenolic plastics, and provided heat-resistant wiring insulation at a low cost. Their main virtues were the cheapness of their materials and production methods; their main weaknesses were inferior strength and appearance. With the lowering in price of the phenolic molding materials, cold molding has been applied to other plastic materials including the phenolic heat-hardening resins. More recently "specially treated" drying oils have been introduced as binders. But with the shortening of the molding cycle of the hot-molding phenolic plastics, the cost advantage of the cold-molding process was lessened to the point that hot molding heat-hardening materials, mainly phenolic, are supplying the bulk of the insulating parts in use today. The cold-molding process is still employed, however, supplying molded products satisfactory for some uses."[5]

Phenolic Plastics

The year, and almost the month that the A. I. Ch. E. pre-organization "Committee of Six" was sounding out sentiment relative to the advisability of forming a society of chemical engineers, Dr. L. H. Baekeland was applying for his "fifth-mol" and "heat-and-pressure" patents. It was about 35 years earlier that Baeyer had called attention to the resin-forming tendencies of phenol and formaldehyde. The introduction of cheap formaldehyde, about 1891, stimulated commercial interest in the reaction. It was then that Kleeberg discovered the heat-hardening "perversity" of certain of the reaction products. Subsequent experimenters carefully sought to avoid this type of product in favor of fusible, soluble products. None of these "workable" resins, however, displayed properties of industrial interest. Smith in 1899 and Luft in 1902, employing solvents and relatively low hardening temperatures were able to prepare non-porous masses, but thick plates required a period of weeks or months to harden. Story in 1905 dispensed with the use of a solvent, but likewise employed low temperatures and slow hardening.

Baekeland began in 1905 reviewing the work and repeating the experiments of his predecessors. His goal was suggested by the failures of his predecessors. As in his work with photographic emulsions, he built his success on what others had sought to avoid. And so it was Kleeberg's porous, unmanageable, worthless mass that challenged his attention. His "fifth-mol" patent gave his answer to the problem of reaction control, while his "heat-and-pressure" patent tells how he turned Smith's, Luft's and Story's weeks or months into minutes, or at the most, hours.

At the February 1909 meeting of the New York Section of the American Chemical Society Baekeland announced his achievement. That it was noteworthy was everywhere recognized and is still accounted one of the outstanding developments of synthetic chemistry. J. W. Aylesworth, who was associated with Thomas Edison, immediately turned his attention to the new product as a promising material for phonograph records. At Kansas University, L. V. Redman, A. J. Weith and F. P. Brock working on a Karpen fellowship to develop a superior furniture varnish, turned their attention to a phenol-methylene reaction, and later to its possibilities in the plastic field. In 1922, after patent litigation favorable to Baekeland, the General Bakelite Co. established in 1910 by Baekeland, the Condensite Co. founded by Aylesworth, and the Redmanol Chemical Products Co. founded by Redman, were merged under the name, Bakelite Corporation.

The amber-like color of the pure resin, its high refractive index and hardness, opened an early use for decorative purposes. Roughcasting the liquid resin, curing, sanding, and polishing was the usual manufacturing procedure. Because of the simplicity of the process, the ease of obtaining pleasing colors and cloudy effects, the casting method has retained its popularity and is in commercial use today.

Finds Application in Electrical Industry

The first to make use of Baekeland's new molding plastic for electrical purposes was Edward Weston, who employed it in molding small bushings for his electric meters. But the electrical industry as a whole had long been in need of an insulating material having the properties of the new product, most important of which were its strength, its rigidity at temperatures well above normal, its imperviousness to water and to oils, and the accuracy and rapidity with which it could be molded.

For electrical insulation and for structural uses as well, laminated materials have found extensive use. In these, paper coated with a solution of the heat-hardening resin, or fabric similarly prepared, is hardened under pressure in multi-layer thicknesses between steam-heated platens to prepare sheets, or on steam-heated steel mandrels to prepare tubing. From these as stock materials suitable forms are machined or punched. Also simple forms such as trays and gear blanks, are hot-molded from the varnish-treated paper or fabric.

Development of the industry since Baekeland's original work has represented steady improvement of product and extension of application. In ease and rapidity of molding the industry has made important progress. The early materials stained the hardened steel molds in which they were fashioned. Also the mold formerly had to be cooled before discharge and the molding cycle was ordinarily from 5 to 20 minutes. Today's materials leave the mold bright, are discharged hot, and employ a molding cycle of only a minute or two. With the reduction in fabrication costs incident to such improvements, with cheaper raw materials, and with an active competitive market that came with expiration of basic patents, the field of application has steadily advanced until the uses of the phenolic resins embrace the structural, the mechanical, and the chemical as well as the electrical industries.

The development of materials adapted to special uses has accounted for most of the research effort of these later years. In fact, the industry has become one of "custom made" products in which special requirement is met by special properties in the material. In other words the demands of the trade have exacted special materials for special uses, instead of one standard type of material for all uses. Thus materials have been developed that are flexible; materials that have marked superiority in impact strength, in electrical properties, and in water, alkali,

acid and solvent resistance. One such special material for a special use is a phenolic denture resin which leaves little to be desired in the way of a permanently light color, along with strength, rigidity and low water absorption.

Among the industries signally served is the automotive industry with its silent timing gears and the accurately dimensioned, interchangeable, molded insulating parts of its ignition system which must remain undistorted under the heat of the nearby engine. Also the industry is indebted to the phenolic resin-bonded snagging wheels which, by their higher working rates, greatly lessen labor and power costs in operation.

An important, rapidly growing field of application is that of "air-drying" protective coatings based on the employment of newly developed oil-soluble phenolic resins.

Aminoplastics

"Aminoplastic" is an adaption of the term "aminoplast" "coined by Manfred and Obrist to describe the products obtained by reaction of urea or thiourea with formaldehyde."[6] "Urea and thiourea react readily with formaldehyde, and the type of product obtained is determined by the proportion of the reactants, by the temperature and by the hydrogen ion concentration.

"The names of Carl Goldschmidt, Hans John, Fritz Pollak, Kurt Ripper and E. C. Rossiter are associated with the development of the urea plastics in Europe. The objectives of their work were dictated largely by previous experience with phenolic plastics, namely toward adhesives, cast materials, laminating varnish, coating compositions, and molding powders. All of these names except that of Rossiter are German or former Austrian.

"The activities in Europe were directed to case or glass-like products for which the urea resins are especially adapted, due to their high refractive index and transparency to ultra violet light, as well as to the production of molding powders. Rossiter, associated with British Cyanides, was the first to produce commercial molding powders of the thiourea-urea-formaldehyde type. His production was begun in 1926 and the products were marketed under the trade name "Beetle."

"The urea-formaldehyde condensation products marketed on the Continent were sold under the trade name "Pollopas, the name being derived from that of the Austrian inventor, Fritz Pollak. World rights to Pollak's processes were acquired by the English syndicate known as Pollopas, Limited, which later licensed the I. G. in Germany and Kuhlmann in France. Both companies now produce urea plastics and market them under the trade name "Pollopas."

"In the United States, Synthetic Plastics Corp., Inc., a subsidiary of American Cyanamid Co., made arrangements with British Cyanides for the acquisition of the Beetle processes and with Pollopas, Limited, for the processes of Pollak. Manufacture of urea molding powders in the United States was started in 1929, the American product also being known as Beetle. Both urea-thiourea and all-urea powders are now being made. In 1931 another manufacturer, the Toledo Synthetic Products Co., placed on the market a urea molding powder developed at the Mellon Institute, the product being known as "Plaskon." In 1932 manufacture of a urea molding powder known as 'Unyte' was begun by the Unyte Corp., associated with the American I. G. and with the Ellis-Foster Co. of Montclair, N. J."[7]

While the phenolic plastics found industry, particularly the electrical industry, awaiting a dielectric of their special characteristic they found the fabricator of insulation had much to learn about the handling of a heat-hardening plastic. The shellac molder employed a flash mold with his plastic in sheet form which was kept soft on a steam plate ready for use. As a concession to custom the first phenolic molding materials were made in sheet form. Obviously, there is a limit in time and temperature to the preheating of a heat-hardening plastic. There followed molding-powders and the closed type of mold with a deep chase to hold the bulkier charge. The next step was the use of preformed material, making possible a shallower mold, or a return, if need be, to the flash mold. Early molds, as well as preforming machines, were of the hand type. A big step was that to the automatic preforming machine and the semi-automatic press with a fixed multicavity mold arranged for automatic discharge. Later came the tilting head press which gave better view of the mold interior.

Molding Practice

In the efficient molding of heat-hardening materials, as contrasted with those that are thermoplastic, there is, of course, the complicating factor of heat-hardening. In early molding practice, the molder, following the procedure employed with thermoplastic materials, cooled the mold before discharge of the molded piece. It was soon recognized that a material that hardened in the heat of molding could be discharged hot. This saved much time but called for a rather fine balancing of conditions. Early molding cycles were from five to twenty minutes; today one to three minutes are sufficient for similar results. Efficient molding practice involves advancing the hardening process in the material to a degree which leaves as small an interval of time as possible between the closing of the mold and the proper hardening of the material of the molded object. This means a nice adjustment of the factors: rate of heat flow; rate of plastic flow; rate of hardening, each influenced by the degree of pre-hardening of the material.

A recent development in the molding of heat-hardening plastics is injection molding, first employed with thermoplastic materials notably cellulose acetate. In this process the plastic material is fused in a separate container and while hot is injected through one or more small ducts into the unheated mold. In the case of thermoplastic materials this avoids the necessity of alternate heating and cooling of the mold. In the case of heat-hardening plastics injection molding has produced deep, thin-walled forms not easily obtained in standard molding practice.

The fabrication of laminated materials was initially a hand operation of dipping, draining, and drying individual sheets. A continuous process of coating and drying was early introduced. The paper was fed from a roll into long drying ovens making possible better control of the amount of varnish added to the sheet; also better control of speed and temperature which are important in the proper advancing or conditioning of the resin. In modern practice provision is made for first driving off and recovering the major part of the solvent, and then "conditioning" the coated (or impregnated) sheets.

The first presses were hand-loaded and had one or two openings. Polished copper plates that required frequent buffing were employed between the steam-heated platens and the material. Modern large-scale practice employs mechanically loaded hydraulic presses, having as high as a dozen openings. The polished copper plates are now chromium-plated, or are of stainless steel, with or without chromium plating. Laminated sheets formerly limited to those three feet square, are now made 10 feet long, and 4 feet wide.

In early practice desired forms were machined from sheet stock. Later many forms were produced by punching. Early punching stock was of low resin content and had to be heated before punching. Today "cold punching" stocks are available which though high in resin content may be punched or sheared without heating.

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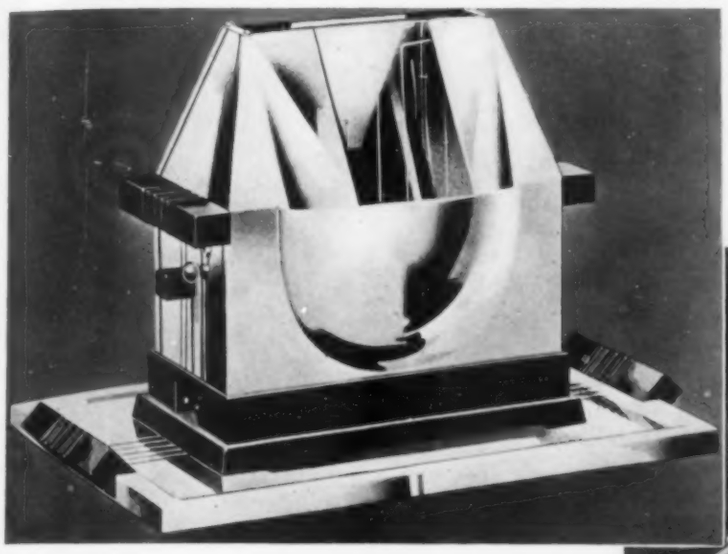
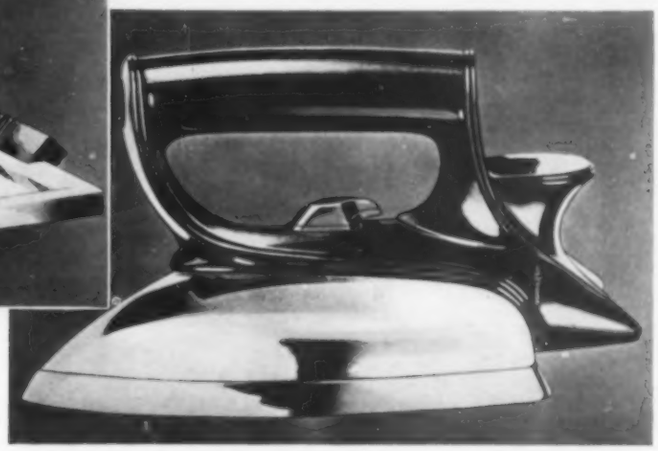
1. From data prepared by Amerigo F. Caprio of the Celluloid Corp. and from other sources.
2. J. Soc. Chem. Ind. 20, 1075 (1901).
3. Communicated by G. P. F. Smith of the Naugatuck Chem. Co., subsidiary U. S. Rubber Co.
4. From data submitted by W. H. Gardner, Shellac Research Bureau, Shellac Imp. Assn., and from other sources.
5. Aid in preparing the statement on bituminous plastics came from several sources, including L. E. Barringer, of the General Electric Co.; W. F. Lent, of Cutler-Hammer; and E. O. Rhodes, of American Tar Products Co.
6. Kolloidzeitschrift, 42, 175 (1927).
7. Communicated by the late G. H. Buchanan, Amer. Cyanamid Co.

Plastics in Pictures

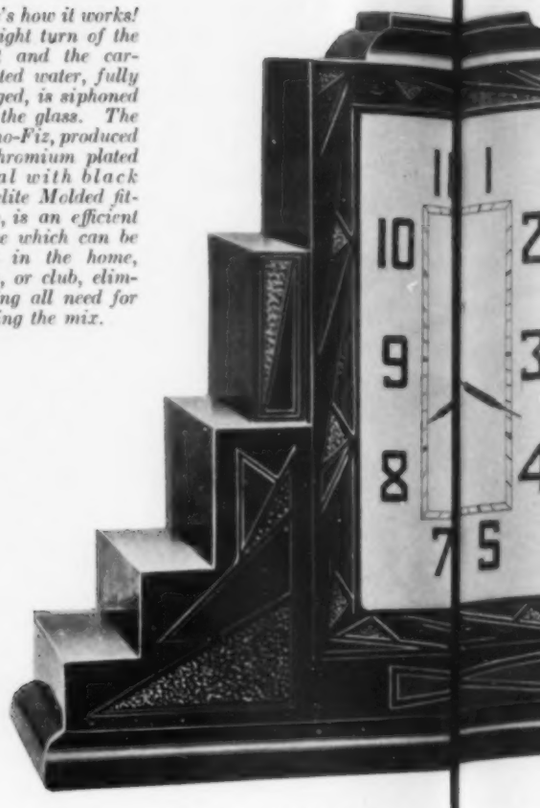


To the left a radically new type of electric toaster the outstanding feature of which is the glass window on either side through which the toasting process may be observed. It is constructed from chromium plated metal which contrasts very effectively with the black Bakelite Molded fittings and was designed by Henry Dreyfuss. Below, this smart looking electric iron boasts a handle unit, which also includes heat control and thumb rest, produced in rich black Bakelite Molded. Designed by Alphonso Ianelli. Both are merchandised by the Birtman Electric Co.



Keeping abreast of the times with Catalin. One of the special tank cars owned by the Catalin Corp. of America. The cars are entirely nickel-clad to insure delivery of absolutely pure and colorless phenol U. S. P. which Catalin uses in the manufacture of their cast—synthetic resin. Capacity of the cars is 60,000 lbs. of phenol.

Here's how it works! A slight turn of the wrist and the carbonated water, fully charged, is siphoned into the glass. The Sypho-Fiz, produced in chromium plated metal with black Bakelite Molded fittings, is an efficient device which can be used in the home, office, or club, eliminating all need for stirring the mix.



Designed in keeping with the spirit of the Cent[ury] Exposition, electric alarm clock, housed in a Bakelite Mold[ed] case and attr[active] design, has been announced by the Middlebury [Corp.]

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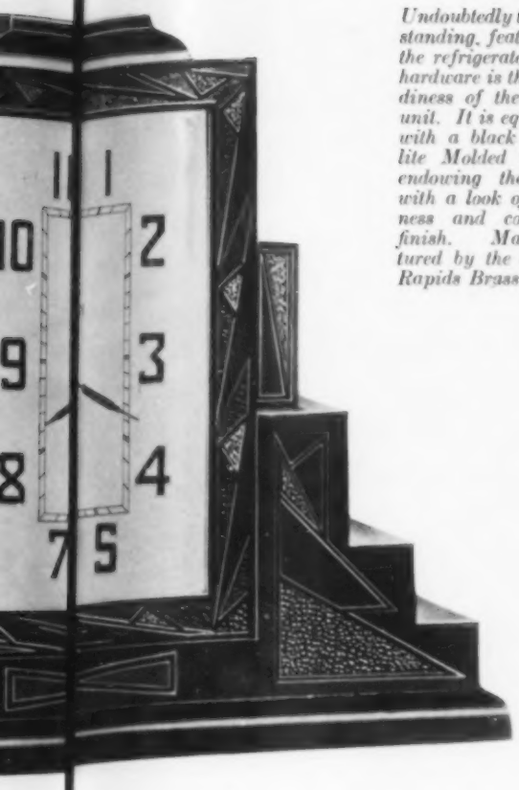


the Cent Exposition, this dite Mold en and attractive ddlebury Corp.

Undoubtedly the outstanding feature of the refrigerator door hardware is the sturdiness of the whole unit. It is equipped with a black Bakelite Molded handle endowing the unit with a look of richness and complete finish. Manufactured by the Grand Rapids Brass Co.

Art material manufacturers are finding Catalin of particular help in their effort to better design and beautify their products. An application showing how Catalin has been employed to improve the appearance of a nationally known air brush manufactured by the Paasche Airbrush Co.

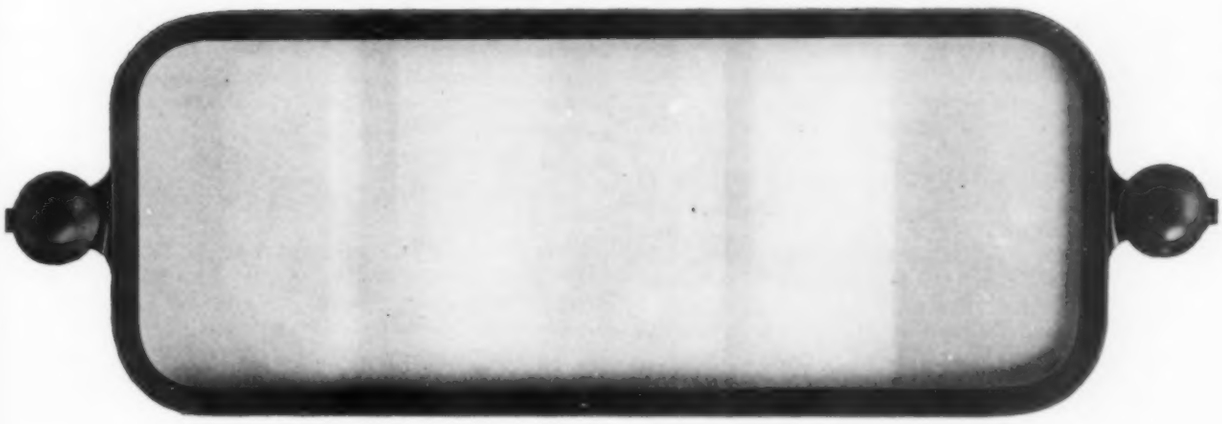
New Plastic Packages

Stikit, the famous glue manufactured by Ault and Wiborg Co., has yielded to the plastic influence, and comes packaged in a handy applicator bottle with a sturdy wrapping of transparent cellulose. The familiar metal base has been replaced by a lustrous, jet-black Bakelite Molded stand which adds a note of distinction to the ensemble.

Combining convenience and appearance as important factors in the packaging of their Sphinx liquid paste and mucilage, the Arabol Mfg. Co. are marketing these products in opal jars, capped with a Bakelite Molded closure to which is fastened a handy applicator made of soft rubber.

Sales of handkerchiefs should be on the up and up when displayed to such happy advantage as this black Bakelite Laminated stand affords. The contrast afforded by the placing of textiles against this highly polished surface is most inviting to the shopper's eye and should prove an incentive to increased sales. Russell Wright, New York designer, created the stand.

Laminated Safety Glass



A Growing Field for Cellulose Plastics

By R. H. Miller
Technical Sales Engineer, Pittsburgh Plate Glass Co.

LAMINATED safety glass depends for its safety features upon the plastic filler sandwiched between two plates or sheets of glass. The plastic lends the element of extensibility, while at the same time very materially reducing the tendency of the glass cover plates to fly and scatter.

In the fabrication of laminated safety glass, the development of the plastic fillers to meet the needs of clear vision, has been perhaps the most outstanding achievement from the point of view of the manufacturer of plastics. Initially, cellulose nitrate proved unsatisfactory because of the inclusion of greater or less amounts of unnitrated or supernitrated particles of cellulose and other contaminating materials, which were seemingly non-plasticizable and produced a serious defect of haze, resulting in severe eye strain. This condition has now been virtually entirely eliminated by improved methods of preparation of the nitrate.

More recently other cellulose plastics have come into competition with the cellulose nitrate originally exclusively used. In some instances these are entirely suitable and certain synthetic resins give some promise of being available plastics for laminating purposes, although most of those so far investigated have proven unsatisfactory for one reason or another.

Laminated safety glass is the product of the bonding of two quite dissimilar materials. It involves the use of adhesives, heat and pressure, and extremely careful control of all factors entering into the assembly. The glass cover plates must be scrupulously clean and of good quality. The plastics must yield a secure bond when the proper cement is used. The cement must have the faculty of wetting both the glass and the plastic and adhering strongly to each. Dust and dirt particles must be eliminated from the air in the assembly room to prevent their inclusion in the finished article. Temperatures and pressures, under which the final lamination is effected, must be held within very close limits under a rigidly controlled time cycle. And withal, the results are remarkably uniform and satisfactory.

To meet the ideal requirements of the laminated glass manufacturer, plastics should be water clear, quite free from any extraneous materials, thoroughly plasticizable by heat and pressure or by pressure alone. The plastic sheet should have high tensile strength with relatively very high elongation or extensibility. It should be quite moisture proof, unabsorbent, and not subject to deterioration by exposure to sunlight. Its plasticity should be only very slightly affected by wide variations in temperature, and finally it should, not to say must, be low in cost.

Pyralin Sheeting Windshield. Courtesy Du Pont.

The history of laminated safety glass has been written several times. Probably it is familiar to most readers of PLASTIC PRODUCTS, but it may none the less be interesting to note that it resulted from the accidental breaking of a bottle in the laboratory of the chemist Benedictus, in France, in 1904, or closely thereabout. The coincidence of breaking a bottle containing a cellulose nitrate film formed by the evaporation of the solution, and two rather serious automobile accidents was the immediate source of the inspiration. The bottle hung together as a unit, though the glass was thoroughly cracked. The glass in the automobiles flew and scattered, resulting in serious damage. Since 1904, progress has been continuous, though rather slow, handicapped by the difficulty of procuring thoroughly satisfactory plastics.

The manufacture, or if you prefer, assembly of laminated safety glass is predicated upon scrupulous care, constant supervision, and extreme emphasis on "good housekeeping." The inclusion of small particles of dust or other similar material is sedulously avoided, and every effort is made to see that every plate is maintained in satisfactory condition from start to finish.

The glass as received at the laminating factory has already received the usual thorough-going examinations of the glass manufacturer, but this is not enough. The laminated safety glass producer insists that the glass shall be chemically clean so, after being cut to template, it is passed through a continuous washing machine where it is given a thorough scrubbing with pumice and water, dried and prepared for the further processing.

The next step is the application of the adhesive or cement to one face of each glass going to form the sandwich. This cement is applied by means of sprays reciprocating back and forth over

the conveyor which carries the glass along the assembly line. It is supplied in aqueous suspension, and the water is virtually entirely removed as the glass proceeds under a drier. At this point, the plastic enters the picture.

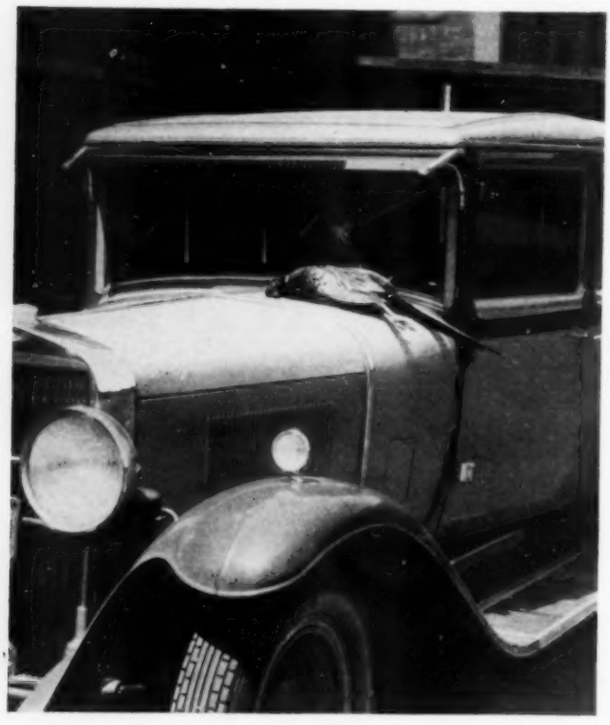
Just as in the case of the glass, the plastic used, whether it be a cellulose plastic or a synthetic resin, is subjected to an extremely exacting inspection, quite beyond anything to which plastic manufacturers had previously been accustomed. Any small particles of unplasticized material are rendered plastic, and if this is not possible, the sheet is rejected or cut into smaller size. The transparency of the sheet is thoroughly tested over Cooper-Hewitt lamps first against a white background and then against a black background, with the object of eliminating any cloudy effect. A careful check of the composition, tensile strength, etc. is maintained at all times.

After the plastic sheet has been found satisfactory, it is cut to template as were its companion glasses, and is ready to be passed into the assembly line. However, it also must be as nearly clean as is possible, so it is passed through a scrubber and drier and enters the assembly line free from extraneous dust and essentially free from static electricity. The plastic sheet is now placed upon the cement coated side of one of its companion glasses, and the other glass, cement side down, placed over all to form the sandwich.

As the assembly moves on its way, it is again carefully examined to be sure that it is perfectly satisfactory, the edges of the glass and plastic are brought into proper alignment and the sandwich is ready for the preliminary pressing.

In the preliminary pressers, only enough heat and pressure are used to obtain sufficiently close adherence between the plastic and the glass to permit of further processing. After leaving the preliminary presses, the glasses are assembled on edge on large buggies or racks, preparatory to the final pressing in the autoclaves.

These autoclaves are huge iron receptacles, through which a fluid may be circulated under relatively high temperatures and pressures. The buggies containing the glass are set into these receptacles and the cover plate securely fastened. The level of the fluid is raised somewhat above the level of the topmost plate, and the temperature and pressure gradually raised. A maximum temperature of about 250 degrees Fahrenheit and a maximum pressure of about 250 lbs. per sq. in. are attained. These conditions are maintained for a definite cycle, and thereafter, the laminated safety glass as such is finished.



Pyralin sheeting used in non-shatterable windshield. Courtesy Du Pont.

However, before it is a salable article of commerce, it must still undergo several further steps. From the autoclave, it is moved to acid vats, where any excess or protruding plastic is removed. Thence it travels to the edging department where the edges of the glass are ground true to master templates. Here also the rounded "pencil" edge or other edge finish is ground and polished as required. It is these edging processes which make necessary the removal of excess plastic, since if this were not done the plastic would clog the grinding wheels and proper edging could not be accomplished.

Final Operations

From the edging department, the laminated glass next moves to the grooving department. Here the plastic filler is cut back from the edges of the glass to a depth of from 1/16" to 5/32". This may be accomplished in several ways, but however done, the depth of groove on any one plate must be uniform throughout. Perhaps the most satisfactory method of accomplishing this is to immerse the plate in a bath of concentrated sulfuric acid for a definite time. This insures absolute uniformity of groove depth on any one plate and almost perfect uniformity for the entire product.

The final step in the production process is the filling of the groove just described with a substantial waterproof sealing compound. This is especially essential along those edges which are set in channels or grooves where moisture might collect. None of the plastics as yet available are entirely non-absorbent, and until such a material is developed, this sealing will be necessary. After the edge sealing is accomplished, the finished laminated safety glass is cleaned, examined and the label of the manufacturer sand blasted upon one corner. It is now ready to move to the shipping room. Here it is once more thoroughly gone over to insure the delivery of satisfactory material. The sticker label of the manufacturer is affixed to the plates, and the packaging completed.

Safety Glass Fills Large Void

Laminated glass fills a very great need for greater safety in our "high speed age". Statistics show that over 45% of the injuries in automobiles in the past have resulted from flying glass. The part which laminated safety glass plays can be measured only by the reduction of this percentage and a comparison of the relative number of cars equipped with safety glass. Another measure would be a comparison of the percentage of injuries occurring in cars equipped with laminated glass as against those not so equipped. In this connection, it is very interesting to note that laminated safety glass windshields are standard equipment on virtually all automobiles today, and a great number of cars offer it as standard equipment throughout. This latter list includes Studebaker, Pierce Arrow, Cadillac, LaSalle, Chrysler, Imperial, Packard, all DeLuxe Ford models, Lincoln, Stutz, Marmon and the higher priced cars of Franklin, Buick, Hupmobile, Hudson, Reo and Nash. Laminated safety glass throughout may be obtained as optional equipment on any of the cars for which it is not already listed as standard equipment.

Michigan, Massachusetts, Nebraska, New York, and Pennsylvania have laws requiring the use of safety glass in automobiles. In each case, the law is applicable to automobiles manufactured or assembled after the effective date of the act, no mention being made of existing vehicles. Ohio, New Jersey and Illinois now have similar bills before their legislatures, and probably such laws would have been considered and enacted by most of the other states had it not been for the emergency legislation with which they were confronted. In Michigan, the law has been in effect since July 1, 1932, with respect to trucks and public motor

vehicles. After July 1, 1934 it will be effective for all cars. Massachusetts has required the use of safety glass windshields on public motor vehicles since January 1, 1933, and the law will become effective for all motor cars after January 1, 1934. Nebraska, New York and Pennsylvania have made their laws effective for all public motor vehicles after January 1, 1934 and for all motor vehicles after January 1, 1935. These three states require the use of safety glass all around, as does Michigan.

As to the relative strength of laminated safety glass as compared with normal glass of the same thickness, considerable information is available. Invariably, laminated safety glass offers a safety factor quite unattainable with normal glass Under slowly applied load it will range from 10% to 15% stronger and under impact—sudden blow—it will sustain from eight to ten times greater strain—a ¼" thick piece of laminated glass will crack but will not break out under an impact which will shatter a piece of plate glass 1" thick.

Laminated glass manufacturers are building up by their processes, protective glasses which will stop the steel jacket bullet from a Colt .45 Revolver, and are producing in a limited way a bullet proof type of laminated plate glass which will stop the hardest shooting army rifle bullet, either steel jacketed or lead.

The manufacturers of plastics have open to them a market for the products of their skill and a field of development which has been barely touched, and a means whereby they can use their own products to enhance their own safety while at the same time increasing their production and profit.

Plasticizing Rubber in Latex Form

For many years now it has been known that it is possible to vulcanize rubber particles while still in latex form, but recently a patent has been taken out in which it is claimed that it is now possible to plasticize rubber while in latex form and thus eliminate largely the familiar mastication of raw rubber by mechanical means. The possible influence of such a discovery on manufacturing processes can well be realized, since if the claims are justified the lengthy and expensive mastication process at present adopted can be cut out.

In essential the process involves bringing the latex into intimate contact with ozone applied in dilution with a gas, such as air, which is substantially inert towards the dispersion. The softening effect produced is proportional to the amount of ozone used, and it is claimed that 30—50 milligrammes of ozone to a litre of latex gives a rubber which corresponds to crude rubber masticated for about thirty minutes on a mill roll. The latex remains in a suitable form for the usual dipping or deposition processes, etc., or alternately it can be coagulated in the usual way and the rubber produced used for rubber mixings without the usual mastication process and, if desired, without the usual softening agents.

Free ozone residual in the latex tends to cause deterioration in the final rubber product, and this may be counteracted by the action of a reducing agent, such as sodium bisulfite, immediately prior to coagulation; such agents are inert towards rubber and substantially non-coagulative of the dispersion.

The inventors consider that the softening effect of the ozone is due to the oxidation of the individual rubber globules dispersed in the latex, this oxidation taking place mainly in the superficial layer of the globule, and that the oxygenated substance thus formed constitutes the softening or plastifying constituent of the ultimate rubber from the treated latex.

The Industry's Bookshelf

Safety Glass, Manufacture, Preparation, Use and Economics of non-splintering glasses, multi-layer safety glass, bullet-proof glass, single-layer safety (hard) glass, and artificial wired glass. By Dr. H. G. Bodenbender. The first complete treatise for manufacturers and users. XVI + 320 pp. with 78 illustrations and numerous tables.

Chemisch-Technischer Verlag Dr. Bodenbender, Berlin-Steglitz. 1933. Price: RM 18, in full linen binding.

With the rise of the automobile and flying industries the development of safety glass has come to occupy a position of foremost interest, for it is an important means of avoiding serious casualties. As is known, about 70% of these casualties have been caused by glass splinters; on these grounds many countries have seen fit to make safety glass compulsory for public vehicles.

In spite of this, this rising young industry has not yet been dealt with in a comprehensive manner as regards literature. The present volume, therefore, fills a gap in technological literature and gives for the first time a review of the whole subject of the manufacture, preparation, use and economics of safety glass which is based on quite practical considerations.

After a review of the historical development of the safety-glass industry the various types of safety-glass are described. There follows an exhaustive description of the manufacturing methods employed for multi-and single-layer safety-glass, containing many clear diagrams. The causes of defects are then dealt with and the methods of avoiding them outlined.

A further chapter on the planning, erection and equipment for a safety-glass factory follows. In this connection it is of not inconsiderable importance to know of the most important protected processes and devices which were developed during the earlier days of the industry. The collection of German and foreign patents, therefore, should be informative and useful.

In the following chapter the properties of the safety-glass which is on the market are dealt with in a thorough manner, and extracts from the official reports on the various types are given. The field of the testing of safety-glasses, which is of importance both for the manufacturer and the user form the basis of a further chapter in which the subject of the practical testing of these products and the various short methods is dealt with side by side with the question of standard testing.

We pass now to the question of the many uses to which safety-glass can be put, and many useful hints are given. The economic section contains an index of the manufacturers of safety-glass in all civilized countries of the world, together with their management, capital, products, etc. A review of prices and an index of trade-marks follows. Full patent, name and subject index guide the reader directly to any desired feature of the work.

Stabilization of Money, by James Goodwin Hodgson, 238 p., published by The H. W. Wilson Co., 958 University ave., N. Y. City.

Stabilization of money—in other words the stabilization of the general price level is a subject of live and vital importance in this day and age of new economic experiments. What was fantastic a year ago is law today. This book, more than any other, supplies valuable data on this interesting phase of controlled economy.

Modern Alchemy, by William Albert Noyes and W. Albert Noyes, Jr., 207 p., published by Charles C. Thomas, Springfield, Ill. $3.00.

For more than a thousand years alchemists sought in vain for the Philosopher's Stone, which should transmute base metals into gold and for an Elixir of Life, which should give eternal youth. The quest was finally abandoned as hopeless, but the transmutation of elements has been observed in recent times and many ways of healing disease and prolonging life have been found. The vicissitudes of the search for transmutation and for healing principles are typical of the progress of science and have been taken as the ground work of this book.

Plastics in the News

DuPont's Pitcher Heads Raw Materials Group—Indictments Handed Up in Atlantic Pyroxylin Explosion—Molders Hold to NEMA Affiliation—Lacquer Producers Form Association—DuPont Wins Against Glidden in Appeal.

Unusual harmony appeared to prevail among the producers of raw materials for the plastics trade when representatives gathered together to draft a N. R. A. code for submission to Washington. Plastics Materials Institute has been

Du Pont's Pitcher Heads Raw Materials Group and joins Chemical Alliance Directorate

formed with A. E. Pitcher, president of du Pont Viscoloid, as president, L. M. Rossi, Bakelite, as vice-president; William P. Pickardt, Unyte Corp., as treasurer; and John E. Walker, former secretary of the Cellulose Manufacturers' Association, as secretary. A code has been forwarded to Gen. Johnson and his subordinates for approval.

Mr. Pitcher is also one of the directors of the resurrected Chemical Alliance,* formed for the purpose of co-ordinating the various divisions of the chemical industry for consideration of fundamental problems in connection with the administration of the national recovery act. This assures the raw materials producers adequate protection in all considerations affecting the group's interests.

The first task the Chemical Alliance has set out to do is to draft a basic code for the chemical industry covering the requirements of the Act with respect to minimum wages and maximum working hours. This code was to be drafted and placed before the board of directors not later than Aug. 7. The Alliance is headed by Cyanamid's president, William B. Bell, and president of the Manufacturing Chemists' Association. Included on the directorate are most of the outstanding leaders in American chemical industry and others will be invited to join.

*Chemical Alliance was formed in August, 1918, to carry on the work of the Chemical Committee of the National Council for Defense. It suspended its activities in 1919, but retained its charter of incorporation and maintained a stand-by condition for such future emergencies as the present one.

Kaiser, Hercules, Resigns

Following the resignation of Harry E. Kaiser as director of the Hercules Experiment Station, Hercules Powder has announced appointment of O. A. Pickett as acting director, effective Aug. 15.

Mr. Kaiser, whose resignation was accepted with regret by Hercules officials, is returning to California where his presence is necessitated by business and family interests. He has been connected with Hercules research work since 1918 and has been director of the Experiment Station since 1922. During this period Hercules Powder has made important research developments in the explosives, naval stores, cellulose and cellulose products fields. In 1931 the Station was transferred from Kenvil, N. J. to elaborate new laboratories near Wilmington, Delaware, in the design of which Mr. Kaiser had an active part. He is a graduate of the University of California. O. A. Pickett for a number of years has been in charge of the Experiment Station Physical Chemistry Division.

Plastics industry is no longer the "baby" of the Chemical Exposition. A beer brewing section will be added for the next exposition scheduled for week of Dec. 4, 1933 at the Grand Central Palace, N. Y. City.

New Woodflour Factor

Lumber Bi-Products, 702 M. & T. Bldg., Buffalo, N. Y., has enlarged activities by establishing a wood flour division, recently purchasing the assets of former New England Mills at Manchester, N. H. Plant covers 6.5 acres. There are two railroad sidings to accommodate 12 cars of raw material and 8 cars of finished product at the same time.

Present production is approximately 1500 tons per month of various grades. Wood flour is finely pulverized wood, which is refined into several grades and is used as a cheap filler in numerous formulas to replace more expensive ingredients. Samples will be sent gratis, upon request, M. J. Watson, president, has been associated with the wood flour manufacturing industry since 1920, and is familiar with the grades desired by the diversified industries.

Rossville Sale Ratified

Rossville stockholders July 18 approved sale of the industrial alcohol business to Commercial Solvents. Contract provides

April Coating (Lacquers, Varnish, Paint) Sales*

Sales of paint, varnish and lacquer products in May totaled $27,574,056 in value, according to a preliminary report by U. S. Bureau of Census from data supplied by 588 establishments. May sales were the best of any month since June, 1931, and compared with $20,343,454 in April and $24,981,441 in May last year. A record of sales in May, a comparison with the preceding months of 1933 and the entire year 1932, follows:—

	Total sales reported by 588 establishments	*Classified sales reported by 344 establishments—Industrial sales—Total*	*Paint and varnish*	*Lacquer*	*Trade sales of paint varnish and lacquer*	*Unclassified sales reported by 244 establishments*
1933—January	$11,946,271	$3,529,916	$2,386,977	$1,142,939	$4,163,960	$4,252,395
February	12,345,600	3,417,387	2,439,732	977,655	4,767,355	4,160,858
March*	14,431,360	3,384,766	2,477,369	907,397	5,794,823	5,251,771
April†	20,295,011	4,664,267	3,130,761	1,533,506	8,633,276	6,997,468
May†	27,574,056	6,053,233	4,360,312	1,692,921	11,752,360	9,768,463
1932—January	15,894,506					
February	16,270,822					
March	19,089,005	Comparable statistics not available				
April	22,612,193					
May	24,981,441					
June	19,637,358	4,685,399	3,617,719	1,067,680	8,734,330	6,217,629
July	14,430,122	3,793,245	2,900,707	892,538	6,058,813	4,578,064
August	16,022,442	3,851,028	3,057,096	793,932	6,918,659	5,262,754
September	16,805,712	3,980,564	3,113,303	867,261	7,216,748	5,608,400
October	15,592,377	3,996,500	3,036,323	960,177	6,610,011	4,985,866
November	13,260,328	3,599,319	2,639,362	959,957	5,196,766	4,464,243
December	10,127,780	3,222,770	2,186,706	1,036,064	3,506,715	3,398,295
Tot., year	$204,734,085	.....	.....	.....	.....	.....
1931—May	33,402,978	Comparable statistics not available				
1931—Total	278,442,170	.....	.....	.....	.....	.....

*Revised. †Preliminary.

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for sale of Rossville's New Orleans plants, the plant of the California subsidiary and certain of the current and working assets of the corporation and its subsidiaries, including inventories, the consideration being 105,000 shares of Commercial Solvents, stock and cash in the amount of the book value of the current and working assets sold. Assets of Rossville and subsidiaries not covered by the sale comprise principally cash, notes and accounts receivable and plants at Lawrenceburg, Ind., and Carthage, Ohio, and certain other facilities which may be adaptable to the manufacture and sale of alcoholic beverages.

Commercial Solvents will begin immediate construction of a $190,000 addition to its Terre Haute plant, according to Major T. P. Walker, executive vice-president. Expansion of the plant is necessitated by acquisition of Rossville, which was recently approved by stockholders of that firm. Addition will be a "breakdown" plant for alcohol manufactured from molasses at New Orleans.

Synthetic Camphor Hearing

U. S. Tariff Commission's hearing July 26 on production of synthetic camphor was very brief, as the commission had already ascertained that domestic production during the first half of the year ex-

Ivan Gubelman, brilliant duPont chemist (formerly a Newport V.-P.) testifies at tariff hearing

ceeded 25% of consumption, thereby complying with the provision of the tariff act for the duty to remain at 5c per pound.

Representatives of the only producer, duPont were present to answer questions. An importer, Sherka Chemical, N. Y. City, sent a representative Frank Layman. Dr. Ivan Gubelmann, of duPont, stated that his company entered the business last winter because prices of camphor fluctuate so widely that consumers desired a stable local supply. Earlier attempts to produce camphor synthetically in this country failed, in his opinion, because not sufficient research was done in preparation. He declared his company has solved the problems, and will continue to produce camphor. V. VanVoorhis of duPont Viscoloid, consumers, explained that manufacturers of pyroxylin plastics and films use practically all the camphor, that for their purposes natural and synthetic camphor are equally good, and that the new duPont synthetic camphor is quite satisfactory.

*Dr. Levinstein was formerly managing director of Levinstein, Ltd., and British Dyestuffs. He is a past president of the Society of Chemical Industry; also Society of Dyers & Colorists, British Association of Chemists, Manchester Literary & Philosophical Society. Clubs: Royal Thames Yacht; Manchester Constitutional. Hobbies: Hunting, fishing. He with the other famous Jewish British chemical industrialist, Lord Melchett, and Sir Harry McGowan, managing director of I. C. I. forms the triumverate of the British chemical executives most widely known in this country.

A Bright Future

Dr. Herbert Levinstein (famous British chemical industrialist) at a dinner ending the annual conference of the British Society of Chemical Industry predicted that softwood supplies from North America would be exhausted in the lifetime of living men.

Said the learned British chemist: "Consumption of wood exceeds the natural increment," and the growth of the consumption of wood for building purposes will have to be curtailed to guarantee supplies for the more important purposes of pulp for paper, plastics, and artificial silk. The fact that the greatest reserves of soft wood at the present time are in Russia is likely to have an important political effect in the future.*

"I confidently predict that plastics will take the place of wood for floors, furniture, and doors, and that plastic materials will be used for decorative purposes, and even in airplanes, ships, and theaters."

Cellulose

Production Statictics

Following table presents monthly statistics relating to pyroxylin-coated textiles based on data reported to the Bureau of the Census by 19 (a) identical establishments comprising most of the industry. Data given include products manufactured by spreading nitrocellulose or pyroxylin preparations, either by themselves or in combination with other materials, upon grey goods, such as sheetings, drills, ducks, sateens, moleskins, etc. Monthly capacity of the 19 establishments, amounting to 11,400,064 yards, in May, is based on a maximum quantity of 1.27 to 1.30 sateen, coated to a finished weight of 17½ ounces per linear yard, in a 24-hour working day, 26 days to a month.

	1931 May	1932 May	1933 April	1933 May
LIGHT GOODS:				
Shipments				
Linear yards	1,422,308	1,089,680	1,431,661	1,954,056
Value	$413,489	$235,900	$300,711	$423,945
Unfilled orders (b)				
Linear yards	1,053,637	659,513	1,031,562	1,056,185
HEAVY GOODS:				
Shipments				
Linear yards	1,763,280	1,099,463	1,349,462	1,805,899
Value	$1,020,381	$506,136	$583,487	$729,473
Unfilled orders (b)				
Linear yards	1,756,596	1,169,399	1,666,966	1,697,242
PRYOXYLIN SPREAD (c):				
Pounds	4,060,229	2,093,687	3,039,051	3,919,677

(a) Of the 19 establishments reporting for May, 1933, 3 establishments did not report prior to January, 1933.

(b) Orders on hand at the close of the current month (reported in yards only) exclusive of contracts with shipping dates unspecified.

(c) Based on 1 lb. of gun cotton to 7 lbs. of solvent, making an 8-1lb. jelly.

Scheinzeit Indicted

Joseph Klitch, owner of the building in which the explosion occurred in North Arlington on June 9, which killed 10 persons and injuring 75 others, and Alex Scheinzeit, president of Atlantic Pyroxylin which stored cellulose in the building, were indicted by the Bergen County grand jury July 25 on a charge of manslaughter.

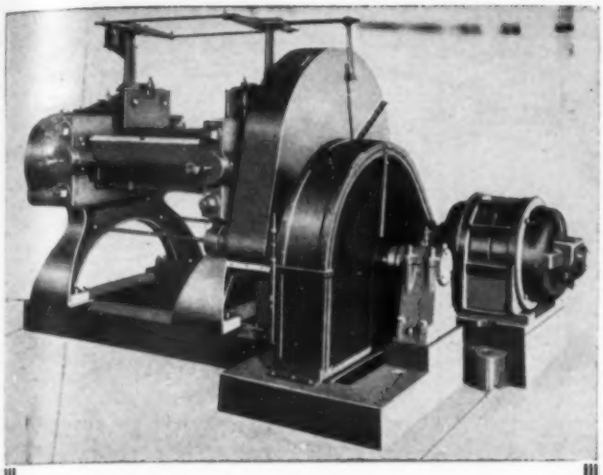
Mayor Daniel P. Rentschler and Councilmen John D. Reese, Alex Allan, Joseph Emery, William J. Downey, Jacob Remm and Terrence P. Finnegan were indicted on a charge of criminal neglect. Indictments were handed up to Judge J. Wallace Leyden of the Common Pleas Court. Former Assistant Prosecutor John J. Breslin Jr., counsel for the North Arlington Borough Council, said the accused would "surrender any time Prosecutor George L. Losche wished.

There is a borough ordinance prohibiting the storage of such high explosives without a permit, and Scheinzeit was operating without such privilege.

The day after the explosion an investigation was begun to determine whether criminal negligence contributed to the disaster. Assistant Prosecutor Charles Schmidt of Bergen County announced that he was preparing to lay the case before the grand jury in Hackensack the following week.

Among the 10 persons who lost their lives by burning or drowning were the wife and daughter of Joseph Klitch, owner of the one-story building and one of the men named in the indictment handed up yesterday.

The explosion created havoc and caused considerable property damage over an



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PYROXYLIN SHEETS, RODS, AND TUBES
MAY, 1933
Compared with preceding months

Bureau of the Census presents in the following table monthly statistics on production and shipments of pyroxylin sheets, rods, and tubes, based on data furnished by nine identical establishments.

Production and Shipments in Pounds

Year and Month	Sheets		Rods		Tubes	
	Production	Shipments	Production	Shipments	Production	Shipments
1932						
January	931,485	890,221	145,145	171,619	56,828	23,431
February	1,148,592	928,066	159,290	144,530	43,509	44,030
March	968,977	845,550	132,430	101,513	69,352	43,739
April	851,145	743,698	80,863	104,662	29,723	24,070
May	659,028	664,585	85,879	84,635	22,795	20,771
June	630,384	572,958	78,792	80,212	25,915	22,150
July	389,115	540,874	64,662	68,818	11,875	20,279
August	539,953	691,390	141,608	125,891	13,735	25,227
September	801,870	941,051	155,423	163,442	29,080	32,703
October	940,231	1,007,355	134,980	187,597	33,175	46,988
November	838,967	818,125	143,731	154,435	25,709	52,410
December	712,601	787,121	71,696	104,729	17,720	26,743
Total (Year)	9,412,348	9,430,994	1,394,499	1,492,083	379,416	382,541
1933						
January	635,078	752,832	75,707	119,098	14,070	29,369
February	597,121	687,672	80,828	101,903	23,092	25,741
March*	535,271	687,474	65,422	90,579	17,582	32,583
April*	593,584	803,891	105,423	131,634	26,200	27,095
May*	983,626	955,359	163,257	126,956	32,768	37,087

*One firm not reporting.

area about a quarter of a mile in diameter. The blast occurred about 9 o'clock at night, showering burning scraps of cellulose down on surrounding homes and on men and women in near-by streets and bathers near by in the Passaic River. Some of the bathers were burned by a blinding sheet of flame that shot out of the plant immediately after the first of the series of explosions.

A number of one-story frame houses were set ablaze and five of them were destroyed. When dawn broke the following morning, the area around the factory had the appearance of a shell-raked village of war times.

State and local investigation were launched immediately. On June 10, Scheinzeit was held as a material witness.

The police were informed that Scheinzeit leased the building five years ago from Klitch, whose home was 100 feet away. Neighbors said there had been much anxiety over the installation of a plant handling dangerous substances.

Tariff Commission Figures

Tariff Commission, in the course of its work, has collected statistics on the production and sales of many important chemicals. Certain of these statistics which have not hitherto been published and may be of interest to the plastics field are summarized in the following text and table. These data cover the noncoal-tar synthetic resins provided for in paragraph eleven.

Production of coal-tar resins other than those derived from phenol and cresol increased about 3% and sales about 13% by quantity, as compared with 24% decrease in production and 30% decrease in sales volume for phenol and cresol derivatives.

More than 150% increase in production and quantity of sales of noncoal-tar resins, statistics for which are publishable for the first time.

Brown Co.'s New "Solka"

Brown Co., Portland, Me., has just issued the first issue of "The Solka Age" a well illustrated magazine devoted to telling the many uses already developed for Solka-name given to the Brown Co.'s new highly purified Alpha cellulose fibre. Many variated uses are mentioned running from Solka base roofings to uppers for women's shoes and molded products.

Viscoloid Personnel

Du Pont Viscoloid organization changes include appointment of L. R. Blackhurst as general manager of the Pyralin Products Dept., succeeding D. F. Carpenter, who has been transferred to Remington Arms. Mr. Blackhurst has been director of sales of the Pyralin Products Dept. He is widely known, having been in charge of sales of various activities of Du Pont Viscoloid for many years.

W. D. Ward, sales manager of the Toiletware Division, has been appointed director of sales of the Pyralin Products Dept., succeeding Mr. Blackhurst. H. R. Dorr, superintendent of maintenance at the Doyle Works, has been appointed director of manufacture of the Pyralin Products Dept. E. E. Bullard, director of manufacture, Sheeting Dept. at the Doyle Works, will have supervision of the service functions at the Doyle Works and will act as contact man on all inter-company relationship and outside activities affecting both Sheeting and the Pyralin Products Depts.

Du Pont has issued new sample card of PX Cloth 3 Color 1096 solid (black) showing new grains and finishes available. Copies obtainable from Fabrikoid division, Newburgh, N. Y.

Sylvania has added 60 ot its staff, increased wages 5%, and stepped up production to 24 hours a day.

In England use of nitrocellulose finishes for leather is rapidly extending. Latest type of leather to which they are being applied is the bright colored sandal leather. Finish is applied without dyeing the leather and it is quite flexible. There has been such a great demand that some firms have had to refuse orders.

Molded

The custom and trade molders in common with all American industries have been busy during the past month with N. R. A. plans. On June 30 Chairman Woodruff (Auburn Button) sent out a letter calling a meeting for July 13. This was held at NEMA headquarters at 155E. 44 st., N. Y. City.

After calling the meeting to order promptly at 10.30 a. m., Mr. Woodruff outlined briefly reason for calling the group together, and then introduced Mr. A. J. Berresford of NEMA, who spoke at length on the various phases of the N. R. A. and the NEMA code.

Following this questions were asked of the speaker. . After considerable discussion the following resolution was offered:

RESOLVED THAT: A committee of seven be elected to organize the custom and trade molders of the country; to draw up a constitution and by-laws, and to call a meeting within 30 days to report a plan of operation under the N. R. A.

Synthetic resins: Production and sales, 1932 and 1931, and percentage of change in production
(Quantities in thousands of pounds and values in thousands of dollars)

	1932				1931				Increase (+) or decrease (−) in production in 1932 from 1931
	Quantity [1]	Sales Value	Unit value	Production Quantity [1]	Quantity [1]	Sales Value	Unit value	Production Quantity [1]	Percent
Coal-tar resins, total	23,891	$5,001	$0.209	29,039	29,343	$7,862	$0.268	34,179	−15.0
Derived from phenol and cresol	15,042	3,946	.262	17,163	21,496	6,646	.309	22,647	−24.2
Derived from other sources [2]	8,849	1,055	.119	11,876	7,848	1,216	.155	11,532	+ 3.0
Noncoal-tar resins, total [3]	1,787	796	.446	1,898	[4]	[4]	[4]	[4]	

1. Based on net resin content.
2. Includes resins derived from phthalic anhydride, resorcinol, and coumarine and indene.
3. Includes resins from urea, vinyl acetate, and petroleum.
4. Not publishable.

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Discussion then turned largely upon the question of whether or not it was advisable to remain as a section of NEMA, or whether an independent organization would better fit the needs of the industry The first resolution was finally withdrawn and the following passed unanimously:

RESOLVED THAT it is the sense of this meeting that all molders should join NEMA immediately, with the understanding that whenever a majority of the membership decides a better affiliation is available, the entire section can and shall be re-affiliated

It was further decided that the secretary should notify all molders of the action taken and that invitations be extended to all to attend a future meeting when permanent officers would be elected. A committee of three, George Scribner, F. H. Shaw, and J. P. Case, was appointed to report on a suitable permanent secretary and the Chairman was authorized to employ a temporary secretary.

The following were in attendance at the July 13 meeting:

Prescott Hindekaper, J. P. Case; M. J. Seigel, American Record Corp.; Douglas Woodruff, Auburn Button Works, Inc.; A. K. Scribner, Boonton Molding Co.; R. H. Cunningham, Bryant Electric Co.; W. L. Kelley, Chicago Molded Products Corp.; B. F. Conner, Colt's Patent Firearms Mfg. Co.; Donald Dew, Die Molding Corp.; T. F. Giblin; R. E. Coleman, General Electric Co.; Geo. Kuhn, Kuhn & Jacobs Molding; G. V. Sammet; H. H. Wanders, Northern Industrial Chem. Co.; J. B. Neal, Norton Laboratories, Inc.; F. H. Shaw, Shaw Insulator Co.; Milton Alden, Alden Products Co.; E. M. Robb, T. F. Butterfield, Inc.; Geo. Walker; B. N. Howell, Garfield Mfg. Co.; E. Steinberger, Insulation Mfg. Co.; Adolph Freidman, Kurz-Kasch Co.; Donald Kendall, Mack Molding Co.; K. C. Ogden, Niagara Fusal-Bake Specialty Co.; G. W. Anderson, Plastic Molding Co.; H. M. Burt; G. H. Burt-Royal Molding Co.; D. G. Maxwell, Tech.-Art Plastics Co.; J. H. Parker, Union Insulating Corp.; Joel Kroninan, Victor Metal Products Corp.; and A. D. Paull, and G. K. Diller of Wheeling Stamping Co.

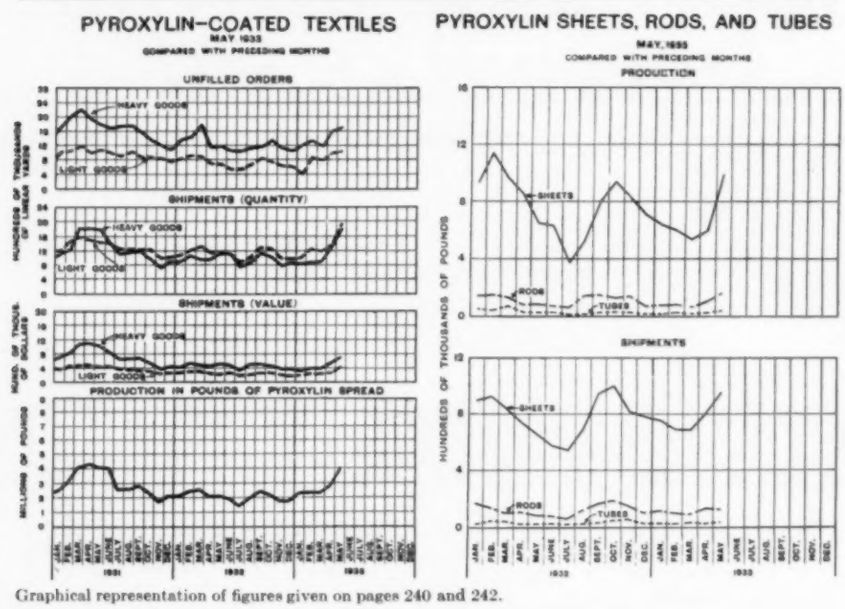
Inquiry at the NEMA headquarters failed to disclose the names of new members joining the group since the July 13 meeting. As we go to press no decision has been reached as to either date of the next meeting, or the name of the most suitable candidate for the office of secretary, although inquiry among the committee indicated that three men are under consideration.

Kron Co. (Bridgeport, Conn. manufacturer of industrial scales of all descriptions) has developed a new portable platform scale. The scale is built with four wheel construction, the wheels being made of a combination of Bakelite and rubber.

Haveg Corp., Newark, Del., has appointed John Beard, as mid-west representative for the new resinous equipment which the corporation is producing. Mr. Beard is making his headquarters in Cleveland.

Prospects

Naturalik Chemical Mfg., Indianapolis, Ind., formed to manufacture cosmetics. "Nu-Paks" a cream and applicator combination is a new product just put out on the market by the American Advertised Products, Chicago. Fornica Insulating, 4628 Spring Grove ave., Cincinnati, has a new product called Fornica Falling, for metal or pressed boards, It is said to be stain-proof, acid-resisting, and warp-proof. Milton Chemical has been organized at Milton, Pa., to manufacture complete line of cosmetics.



Graphical representation of figures given on pages 240 and 242.

Laminated

Westinghouse has appointed H. C. Thomas head of Micarta Sales. Upon graduating from Purdue in 1910, Mr. Thomas joined apprenticeship course of Westinghouse. He next joined the repair

Westinghouse's Thomas predicts great future for "Micarta"

department, later was transferred to the circuit breaker and switch section of the supply department and then became a salesman in the St. Louis office. His service with Westinghouse was interrupted by war duties, but he returned to St. Louis in 1919.

When a merchandizing department was created in 1922 he went to New York as assistant to the manager of that department. Later he moved to Mansfield, Ohio, and in 1927 he was returned to East Pittsburgh in an executive position and later was made assistant to general works manager, from which position he steps into his present appointment.

"Micarta," states Sales Manager Thomas, "has probably more applications in building operations than any synthetic material yet developed. Aside from its fundamental perfection as an insulating material, use of this product now must be considered in any building project. Its artistic possibilities alone—we are now exhibiting micarta murals, a new decorative possibility, at a Century of Progress, in Chicago—promise to bring about a revolution in art subjects of this nature. However, its use as a wall material, for table tops, store fronts, panelling of all sorts, in varied colors, shapes or treatment, provide it with infinite possibilities for service. Micarta in the future, we expect, will take its place among the most necessary building materials in the world."

Foreign Viscose Paper

Societe Industrielle de Cellulose, largest Belgian maker of transparent viscose paper, experienced a decline in net profits last year to 12.4 million francs, from the 27.4 million francs of 1931.

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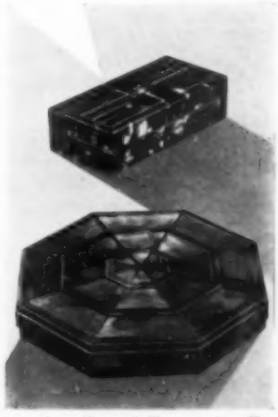

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Coatings

Lacquer and N. R. A.

Industry, eager to render spontaneous support to President Roosevelt's stirring plea for N. R. A. cooperation, is finding that the task is a difficult one. Earnest desire to put a willing shoulder to the wheel is one thing, manufacturers are finding, and ability to coordinate diverse purposes into harmonious groups with suitable operating machinery, is quite another.

On Friday, July 28, a meeting of the National Paint, Oil and Varnish Association and the American Paint and Varnish Manufacturers' Association was held at the Hotel Roosevelt attended by about 250 representatives. At that meeting approval was finally given to an industry code presented by Chairman Ernest T. Trigg of the Code Committee. After a rather limited discussion some minor changes were made in the final draft. General concensus of opinion of the meeting appeared to be, it is reported, that haste was essential, and that the industry should be represented by a code presented by Aug. 1.

Inquiry among lacquer producers seems to indicate strongly, however, that the lacquer producers are not satisfied with the blanket code that Mr. Trigg was authorized to take to Washington. Among this group were a large number who expressed the opinion that the code is largely a trade sales agreement and does not either fully represent or sufficiently protect the medium or small lacquer producer. Specific mention is made of a group of five to represent the lacquer subdivision, but to several lacquer manufacturers this was not satisfactory for a number of reasons.

CONSTITUTION AND BY-LAWS OF LACQUER MANUFACTURERS ASSOCIATION

PREAMBLE

WHEREAS it is deemed advisable to promote and maintain friendly relations among the manufacturers of lacquer in the United States; and

WHEREAS it is deemed necessary, in order that lacquer manufacturers may cooperate with other trade associations and with the federal government to carry out the purposes and objects of the National Recovery Act, that an organization be formed which can consider and take action on problems unique to the lacquer industry, and can represent the interests of the lacquer industry in the preparation of general codes affecting the lacquer industry, and in the administration and enforcement of the provisions of such codes;

WE, THEREFORE, form ourselves into an association.

CONSTITUTION

Article 1. **Name.** The name of this association shall be the Lacquer Manufacturers Association.

Article 2. **Membership.**

Section 1. Any individual, firm or corporation manufacturing lacquers in the United States shall be eligible to membership in this association.

Section 2. Application for membership in this association shall be made on the prescribed form to the Board of Directors who shall pass upon the eligibility of all applicants. Applicants who have been approved by the Board of Directors and have agreed to abide by the Constitution and By-Laws of the Association and have paid the initiation fee and dues for the initial period of their membership shall become members of the Association. It shall be the duty of the Secretary to notify all applicants promptly of the approval of their applications by the Board of Directors and, upon fulfillment of the above requirements, of their acceptance as members of the Association.

Article 3. **Officers and Directors.**

Section 1. The officers of this Association shall be a President, a Vice President, a Secretary and Treasurer. The office of Secretary and Treasurer may be held by one individual who need not be a member of the Board of Directors.

Section 2. Directors. There shall be six directors.

Section 3. Board of Directors. The Board of Directors shall consist of the President, Vice President and the six Directors.

Section 4. General Manager. There shall be a General Manager of the Association who shall be engaged by the Board of Directors and whose compensation shall be determined by the Board of Directors.

Article 4. **Election of Officers and Directors.** Officers and Directors shall be elected at the annual meeting to serve for one year or until their successors are elected.

No less than sixty (60) days before the annual meeting, it shall be the duty of the President to appoint, subject to the approval of the Board of Directors, a nominating committee of five (5) members who shall report to the Secretary the names of the candidates selected for officers and directors at least twenty (20) days before the date of the annual meeting. The Secretary shall send the report of the nominating committee to each member at least ten (10) days before the date of the annual meeting. The Chairman of the nominating committee shall be a member of the Board of Directors. The remainder of the committee shall be selected from the members not represented on the Board of Directors.

Each member shall have one vote in the election of each officer and director. He may vote through a representative present at the annual meeting or by proxy.

Article 5. **Duties of Officers.**

Section 1. President. It shall be the duty of the President to preside at all meetings of the Association and the Board of Directors; to make such appointments as are provided in the Constitution and By-Laws and to perform such other executive duties as the Board of Directors may require.

Section 2. Vice President. In the absence of disability of the President, it shall be the duty of the Vice President to perform all duties pertaining to the office of the President.

Section 3. Secretary. It shall be the duty of the Secretary to keep a record of all meetings of the Association and of the Board of Directors; to carry on correspondence, to send notices of meetings of the Association and of the Board of Directors as required in the By-Laws and to perform any other duties required by the Constitution and By-Laws.

Section 4. Treasurer. It shall be the duty of the Treasurer to receive, care for, disburse and account for the funds of the Association in accordance with instructions received by him from the Board of Directors.

In case of the disability of the Treasurer the President or Vice President may assume these duties or the Directors may elect one of their members temporary Treasurer.

Section 5. General Manager. The General Manager shall have general supervision over the affairs of the Association and perform such duties as may be delegated to him by the Board of Directors.

Article 6. **Duties of the Board of Directors.** The Board of Directors shall have control of the affairs of the Association and of its funds.

Article 7. **Vacancies in Office.** The Board of Directors shall fill any vacancy occurring between annual meetings.

Article 8. **Amendments.** This Constitution may be amended or revised at any annual meeting of the Association by an affirmative vote of not less than two-thirds of the members present at the meeting either by representative or by proxy provided that the proposed amendment shall have been approved by the Board of Directors and shall have been submitted to the membership at least ten days prior to the meeting annual.

Paint Code Too Specific

It is felt, in a number of quarters, that the code adopted at the July 27 meeting is far to specific, particularly on the question of selling prices, container sizes, etc. Among a number of lacquer manufacturers the opinion has been expressed repeatedly that it would have been much more desirable to have followed the example of the automotive industry in its code work. In that particular instance the Automotive Chember of Commerce is expected to act as an intermediary between the various subdivisions of the industry and the N. R. A. in questions of policy that will arise in the future. Lacquer producers are not in accord by any means, say those close to the industry set-up, and the majority feel that the paint code does not provide the machinery they wish to see present.

Association Merger

It was strongly intimated at the meeting on July 27 that the two major paint associations will be merged into one in the near future. This is a matter that has been talked of and debated for years without any practical results. Only last spring a committee reported that it could see no reason for any such merging of interests, further than what had been accomplished by placing the associations in the hands of one executive secretary. It is now felt, however, that greater harmony and greater recognition from the government will follow such a reorganization move.

Uncertain Over Protest

The group of lacquer producers who have rallied around the Breyer banner have not as yet made a decision as to whether or not they will authorize Mr. Breyer to go to Washington to protest against including the lacquer producers within the general paint code and to submit for consideration by N. R. A. officials a draft of a code sent out July 14 to all lacquer manufacturers for approval.

In the meantime a number of lacquer producers have laid plans for the formation of a Lacquer Manufacturers' Association.* It is reliably reported that about 30 producers have signified their intention of forming a permanent organization, and

*Meeting has been called for Aug. 17 at the Chemists' Club (N. Y.) at 11 A. M., to form such Association or Institute. Tentative constitution is given above.

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the leaders in this movement believe that this number will grow rapidly once the purposes of the Association become clear. In this connection Frank G. Breyer sent on July 27 to every lacquer producer the following letter, outlining the major purposes of the proposed organization.

To All Lacquer Manufacturers

There are many reasons why an industry such as lacquer, which did 25 million dollars worth of business in 1932, should have a manufacturers' association devoted exclusively to that industry and nothing else. For a small expenditure of time on the part of each unit and a fraction of one per cent. of the annual sales an acceptable office and a competent executive can be retained to look out for the interests of the industry at all times.

Among the many reasons for such an association which will suggest themselves to you are the following, which are here emphasized because of their timeliness:

1. To maintain lacquer manufacturers as independent American business men.
2. To make more secure the business and profits of both custom producers of lacquer and mass producers of lacquer.
3. To encourage initiative and research in the lacquer field.
4. To publicize lacquer and lacquer products.
5. To promote the sale and use of lacquer.
6. To improve credit conditions and promptly spot dishonest purchasers of lacquer.
7. To discourage and if necessary defend against monopoly or monopolistic practices.
8. To restrain unfair competition in its more subtle and far reaching practices as well as in its more obvious and well-recognized forms.
9. To dissuade companies who make raw materials from entering the business of lacquer manufacturing.

With these and many other worthy objectives in mind, approximately 30 manufacturers of lacquer have determined to form the Lacquer Manufacturers Association. A very simple constitution and by-laws are proposed for your consideration. A meeting is called for 11 A. M., Thursday, August 3rd, 1933, at the Chemists' Club, 52 East 41st Street, New York City, to effectuate the organization and to elect the executive committee. The question of financing the organization will be discussed at the meeting. Since the number of members will probably be relatively small in the beginning, it is proposed to start with a very modest program and expand as the work done justifies it.

If you are in favor of organizing the Lacquer Manufacturers Association for the purposes set forth in this letter and others, and if the constitution and by-laws as suggested are agreeable to you, won't you please write me to that effect so that you may be counted in with the group whose loyalty to lacquer is unquestioned and whose determination to maintain their independence in that field is unswerving?

Your support of the Lacquer Manufacturers Association in no way interferes with your support of any other association or institute in which other divisions of your business may be affected. If this association were to serve no other purpose than to constitute a fearless and outspoken minority, it would be well worth while.

Yours very truly,
FRANK G. BREYER.

Du Pont vs. Glidden Again

So-called Flaherty lacquer patent litigation (du Pont vs. Glidden) reached a second stage last month when the U. S. Circuit Court of Appeals, for the 2nd Circuit, in a decision written by Judge Learned Hand, reversed the decision of the lower court (District Court for the Eastern District of N. Y.) which had held that claims, 2, 3, 6, 8, 9, 12, and 17 of the patent were invalid because of noninvention.

Opinion of the appellate court reviews at length the history of the early experiments on low viscosity lacquers. Following summary presents conclusions of the judges:

"Therefore, we are disposed to regard Flaherty's work in this case as invention. From him dated in fact a contribution whose value cannot be denied; to him must be attributed the first practicable, low-viscosity lacquers, whose desirability had been known long enough to make them the subject of much experiment; we can discover nothing but the control of viscosity which achieved success, obvious as that may now seem; that information turned out to be enough to direct the art. There may be some illusion in all this, of which we are not aware, but as the case stands, to assimilate his work to mere craftsmanship would be a denial of the facts before us. Moreover, the patent has been recognized by fifty-two manufacturers who have taken licenses. True, this must not be pressed too far; it is easier to pay tribute than to fight, and a substantial part of the trade has combined in this contest. But courts have always treated such recognition as a relevant consideration and certainly it may not be altogether disregarded. Thropp's Sons v. Sieberling, 264 U. S. 320, 329, 330.

Flaherty originally claimed a higher limit of viscosity than 4.6 seconds. Not only was he forced to disclaim, after suit brought, claims to 16.2 second, nitro-cellulose, but his specifications still contain the statement that "generally" the critical limit is as high as that (page 3, lines 2-9). He was more acquisitive than he should have been, as inventors often are; but that ought not to take away from him his invention, if he made one. The claims in suit are limited to 4.6-second viscosity, and that is what he actually found. The very purpose of the disclaimer statute is to allow retraction, in the absence of bad faith, which is not here asserted. That he should have wrongly guessed that the limit was higher does not abate from the fact that he has

CODE FOR THE LACQUER INDUSTRY

A code of fair competition and trade practice for the lacquer industry in the United States fixing maximum hours of work and minimum rates of pay.

1. For the purpose of carrying out the policy of Congress as expressed in the National Industrial Recovery Act, the lacquer industry of the United States, as represented by "The Lacquer Industry Committee," adopts the following code:

2. Definitions.

"Lacquer" when used herein is defined as a coating material containing nitrocellulose and/or cellulose acetate, and/or synthetic resin, and/or other equivalent material, dissolved or dispersed in a volatile liquid and designed to produce a satisfactory coating as soon as the volatile liquid has substantially evaporated.

"Lacquer manufacturer" as used herein is defined as any person, partnership, association or corporation manufacturing finished lacquer for sale or for use as a coating material.

"Effective Date" as used herein is defined to be the 11th day after this code has been approved by the President of the United States.

3. Any existing lacquer manufacturer, whether a member of any association or not may participate in this code and any subsequent revision thereof by indicating his intention to fully subscribe to the provisions of the code and by defraying his pro rata share of the cost of administering and enforcing it and by assuming the responsibility of such a participation even though he may not be a member of any subscribing association.

4. Lacquer manufacturers will comply with the following provisions of the N. I. R. A.:

(a) that employees shall have the right to organize and bargain collectively, etc.

(b) that no employee and no one seeking employment shall be required as a condition of employment to join any company union, etc.

(c) that employers shall comply with the maximum hours of labor, minimum rates of pay and other conditions of employment approved or prescribed by the President.

(d) that the President may from time to time cancel or modify any order, approval, license, rule or regulation issued under this title.

5. (a) On and after the effective date lacquer manufacturers will not employ any person under the age of 16 years.

(b) On and after the effective date the minimum wage that shall be paid by any lacquer manufacturer to any person engaged in the processing of the products of the lacquer industry and in labor operations directly incident thereto shall be 40c per hour for men and 30c per hour for women.

(c) On and after September 1, 1933 the minimum wage that shall be paid by any lacquer manufacturer to all other employees shall be at the rate of $14 per week.

(d) The minimum rates of wages provided in this article shall apply to all persons employed in cities of 200,000 and over. They shall apply in all other localities unless the administrator or his representatives shall fix a lower rate, not to exceed 10%, for the particular locality.

6. No lacquer manufacturer will employ any individual in excess of 40 hours in any one week during 34 weeks of any calendar year, nor in excess of 48 hours in any one week during the remaining eighteen weeks of any calendar year.

Provided, however, that these limitations shall not apply in cases of emergency. At the end of each calendar month every lacquer manufacturer shall report to the supervisory agency hereinafter provided for such detail as may be required, the number of man hours worked in that month for emergency reasons and the ratio which said emergency man hours bear to the total number of man hours during said month.

7. The Lacquer Industry Committee is hereby designated as the agency for administering supervising and promoting the performance of the provisions of this code by the members of the lacquer industry.

With a view to keeping the President of the United States and the administrator informed as to the observance or the non-observance of this code and as to whether the lacquer industry is taking appropriate steps to effectuate in all respects the policy of the N. I. R. A., each lacquer manufacturer shall prepare and file with such person or organization as the Lacquer Industry Committee may designate, and at such times and in such manner as may be prescribed, such data or information concerning plant capacity, volume of production, sales, orders, stocks on hand, number of persons employed, wage rates, earnings, hours of work, etc., as the Lacquer Industry Committee may from time to time require.

8. Except as otherwise provided in the N. I. R. A., all statistical data filed in accordance with paragraph 7 shall be confidential and the data of one lacquer manufacturer shall not be revealed to any other lacquer manufacturer except that for the purpose of administering or enforcing the provisions of this code the Lacquer Industry Committee, by their duly authorized representatives, shall have access to any and all statistical data that may be furnished in accordance with the provisions of this code.

9. Every lacquer manufacturer shall use an accounting system which conforms to the principles of, and is at least as detailed and complete as, a uniform and standard method of accounting approved by the Lacquer Industry Committee, with such variations therefrom as may be required by the individual conditions affecting any lacquer manufacturer and as may be approved by the Lacquer Industry Committee.

10. No lacquer manufacturer shall sell or exchange any product of his manufacture at a price or upon such terms or conditions that will result in the customer paying for the goods received less than the cost to the seller as determined in accordance with the uniform and standard method of accounting hereinabove prescribed, provided however that discontinued lines, stocks, or inventories which must be converted into cash to meet emergency needs, may be disposed of in such manner and on such terms and conditions as the Lacquer Industry Committee may approve.

11. The Lacquer Industry Committee shall publish uniform regulations concerning terms of sale, discounts, dating of orders, etc. Every lacquer manufacturer shall be bound by such rules unless immediately upon their receipt he notifies the Committee of his intention to use different terms, discounts, etc. and states exactly what terms, discounts, etc. he will use. Thereafter he shall use no other terms, except those terms, discounts, etc. contained in his statement to the Committee unless he shall have notified the Committee at least two weeks previous of his intention to quote different terms, discounts, etc. and has stated what his new terms will be.

12. No lacquer manufacturer shall give or accept rebates, refunds, allowances, unearned discounts, or special services not included in the cost of the product, in connection with any sale of lacquer.

13. (a) This code is not designed to promote monopolies and shall not be availed of for that purpose.

(b) The provisions of this code shall not be so interpreted or administered as to eliminate or oppress small enterprises or to discriminate against them.

14. This code is subject to modification or enlargement as the experience with its operation develops the necessity thereof.

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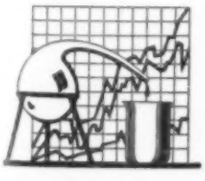

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found the actual limit; that which the art has now adopted. He could not be expected to set a definite figure; there is none for viscosity may vary even below his limit. But he did set that limit definitely, and in a chemical patent that is all that is required. The supposed vacillation in his conception seems to us to be no more than is permissible to one who has in fact discovered a chemical invention of substance, but who is in doubt whether it may not extend beyond his experimental verification. Somewhere no doubt he must set his bounds at his peril, and that he did."

Glidden Asks Rehearing

The defendant Glidden has filed a petition for rehearing alleging the following:

1. The prior workers in the art had not failed to make a useful lacquer from nitrocellulose whose viscosity-characteristic was below Flaherty's limit. It was not in the nitrocellulose base but in the compounding ingredients that Bacon's Adamantine X differed from Flaherty's viscolac.

2. It was not viscolac that replaced automobile body paints and wood varnishes, and those commercial applications cannot, as a matter of fact, be invoked to establish invention in Flaherty's disclosure over the prior general knowledge of the relation of viscosity-characteristic to covering power and the prior particular knowledge of nitrocellulose lacquers (of more limited commercial applications) containing nitrocellulose having a viscosity-characteristic below 4.6 seconds.

3. The work, knowledge and prior disclosure and use of Carlsson & Thall, of Bacon, and of Doerflinger, is direct anticipation.

4. Bacon was ahead of Flaherty at every step of the closely parallel paths they followed. Between February 7 and February 15, 1921 Flaherty modified the nitrocellulose base of his brush handle lacquer in the same way and for the same purpose that Bacon had modified his Adamantine XX to produce Adamantine X prior to January 13, 1921.

5. Doerflinger's product was below Flaherty's limit and was such a lacquer as Flaherty's patented viscolac.

6. The limit of viscosity-characteristic of the Flaherty patent is not critical in any sense.

7. It is not true that, as this Court supposed, a point was found by Flaherty, or has been found by any one else, below which the resultant film is too "brittle to be corrected by softeners."

8. This Court has followed to a conclusion clearly erroneous a path that is closed by a substantive rule of law.

9. Claims 12 and 17 are necessarily invalid.

According to a new German patent, hard yet highly elastic lacquers are made by the condensation of castor oil with phthalic acid or its anhydride. (*Synthetic & Applied Finishes, July 1933*). This and similar resins produced with various polybasic acids and other oils containing hydroxyl groups are said to impart to lacquers the properties of hardness, elasticity and excellent adhesion.

Tetrachloride in Lacquers

Low-viscosity nitrocellulose lacquers are said to be rendered completely non-inflammable by including a high percentage of carbon tetrachloride in the solvent mixture, according to English Patent 390,867. 1. British Standard Specification No. 488—1933: "Moulded Insulating Materials suitable for Accessories for General Electrical Installations." 2s. net, 2s. 2d. post free. British Standards Institution, Publications Dept., 28 Victoria Street, London, S. W. 1.—is attacked on several counts in an article in July issue of *British Plastics*.

Rumors continue about the new lacquered tin beer containers. *N. Y. Times* reports that the glass industry is concerned about the possibility of beer marketed in non-returnable tin containers making serious inroads into the bottle industry.

Financial

Glidden reports for eight months ended June 30, 1933, net profit of $667,691 after depreciation, federal taxes, etc. equivalent after eight months dividend requirements on 7% prior preferred to 50c a share on 650,000 no-par shares of common stock. This compares with net profit of $55,117 equal after subsidiary preferred dividend requirements, to 57c a share (par $100) on 69,000 shares of 7% prior preferred for eight months ended June 30, 1932. Subsidiary preferred stock was called for redemption in October, 1932. June net profit was $307,062 after taxes and charges against net loss of $65,056 in June, 1932.

Devoe & Reynolds

Devoe & Raynolds subsidiaries, report for six months ended May 31, 1933, profit of $48,629 after expenses, depreciation, etc., but before federal taxes, comparing with $13,548 for the six months ended May 31, 1932.

Current assets as of May 31, 1933, including $1,365,660 cash and federal and state short term obligations, amounted to $6,212,784 and current liabilities were $854,094. This compares with cash and federal and state short term obligations of $1,114,517, current assets of $6,908,826 and current liabilities of $628,858 on May 31, 1932.

Consolidated income account for six months ended May 31, 1933, compares as follows:

	1933	*1932*	*1931*
Net sales	$3,464,693	$4,312,449	$5,758,464
Costs & exp.	3,352,253	4,229,571	5,397,968
Depreciation	42,545	47,026	131,403
Oper prof.	$69,895	$35,852	$229,093
Other income	52,539	62,633	71,725
Total income	$122,434	$98,485	$300,818
Disc misc adj etc	73,805	84,937	101,441
*Profit	$48,629	$13,548	$199,377

*Before federal taxes.

Du Pont report for quarter ended June 30, 1933, states that the company earned 68c a share on its common stock, including dividend from G. M. investment amounting to 23c a share on du Pont common. This compares with total earnings of 35c a share on du Pont common, including 23c a share from G. M. investment in preceding quarter and total earnings of 27c a share on du Pont common, including 23c a share on G. M. investment, in June quarter of previous year.

For six months ended June 30, last, earnings were equal to $1.03 a share on common, including dividends from G. M. investment amounting to 46c a share on du Pont common. This compares with $1.01 a share on common shares in first six months of previous year including dividend from G. M. amounting to 69c a share on du Pont common stock. Above figures include company's equity in undivided profits or losses of controlled companies not consolidated.

Sherwin Williams declared a dividend of 25c on common, payable August 15 to stock of record July 31. Common dividend was omitted last quarter. Six months ago 25c was paid. Regular quarterly dividend of $1.50 on preferred was also declared, payable Sept. 1 to stock of record Aug. 15.

Directors approved a general wage increase equivalent to 11%, effective Aug. 1, applying to all classes of workers.

President George A. Martin, stated that earnings for 10 months to June 30 were such as to provide a comfortable margin above dividend requirements, including common dividends paid during fiscal year.

Booklets

Bakelite Corp., 247 Park ave., N. Y. City, New booklet "The Versatile Service of Bakelite Resinoid" is a short story of the various Bakelite products, production, history, etc. Bul 1.

Bakelite Corp., July issue of the "Bakelite Review" features "Impact" new Bakelite molding material that is several times stronger than standard woodflour types. Also gives an unusual number of new uses for various Bakelite materials. Bul. 2.

Boonton Molding, Boonton, N. J. Industry is indebted to Boonton Molding for "A Brief Description of the Commonly Used Plastics Compiled for Engineers and Buyers"—really a short text-book on plastics. Bul. 3.

General Plastics, North Tonawanda, N. Y. August "Closure News" in addition to showing the usual number of new uses for Durez, tells the story of Designer-manufacturer, Russel Wright, a phenomenal depression success. Bul. 4

Howards & Sons, Ltd., Ilford near London, England. A very complete booklet giving properties of several important new solvents and plasticizers, some of which are not generally known in this country. Bul. 5.

John Robertson Co., 121 Water st., Brooklyn, N. Y. "Robertson Reminders" for July tells the latest news about Robertson presses. Bul. 6.

Plastic Products,
25 Spruce Street,
New York City.

I would like to receive the following booklets. Specify by number, viz. Bul. 1; Bul. 2, etc......

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Aug. **Address**.....

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WANTED: The following copies of PLASTIC PRODUCTS: January, February, March and May 1927; January, March, April and October 1930; January, March and December 1931.

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And Now, in Closing:—

The National Industrial Recovery Administration is putting on a campaign that is turning the entire country into a regular camp-meeting ground. Strains of that old song "NIRA, ta-da, tee-dee" can be heard echoing along every latitude and longitude on North America. Especially is that true of the last line which goes, unless our memory fails us, "NIRA, *to thee!*"

We complain of overcrowding in our public vehicles of transportation, streets and restaurants. What will it be when we all go to work at nine, lunch from twelve to one, and knock off at five, sharp? Evidently there will have to be a code for Loafing and Loitering and Vacationing.

"Have lunch with us to-morrow at the Chemists Club," was our invitation to a busy plastic executive. "Can't. Going to have a code in the hed" was his reply.

To which might be added that his partner has a summer place on Cape Code, Massachusetts.

We were careless last month in not giving credit where credit was due. Dr. Frederick Walker, who wrote about the methylene ether-esters, was not identified properly. He is associated with the R. & H. Chemicals Department of E. I. du Pont de Nemours, and his article was a contribution from their laboratories.

However, Industry generally seems to be having much the same trouble by giving credit where credit was past due.

The recent publication of the American Institute of Chemical Engineers, "Twenty-five Years of Chemical Engineering Progress," contains a wealth of informative reading. One of its most accurate and instructive chapters is the one appearing in abstract in this issue by A. J. Weith and A. V. H. Mory. They take great pains to detail the early developments of the plastics industries and their present possibilities. This article should be particularly helpful to those many new, uninformed, friends of the industry.

According to the latest advices from the Tariff Commission, the production of synthetic resins in 1932 was 36.2% less than in 1931. Not so worse, what? Hark, then, to this portion of their report: 1932 showed a $5,000,000 increase in value—roughly one-third—over the previous years larger sales! Not only remarkable but astounding. We don't expect you to take our word for it; you can write to Washington, if you wish.

A recent Westinghouse advertisement featured Micarta as that "Hotcha material with the ginger ale flavor." Sounds like a bartenders ad written by Jimmie Durante.

Of course, to parody the old saw, one man's carbolic acid may be another man's ginger ale.

U. S. Patent 1,918,944 is for an attachment for screw drivers. This fact alone is unimportant, but we note it to call attention to the name of the patentee,—L. G. Sylvester, former American Record head, at present prominently mentioned for the post of trade secretary for the molding industry.

This Month's Cover

Illustrative of the coating applications at the Century of Progress Exposition, as described in this number by Charles E. Fawkes, is the "House of Tomorrow" pictured on our front cover. Designed by George Fred Keck, and on exhibit at the Fair, this futuristic dwelling is constructed of cement-asbestos board finished with plastic brushing lacquer over a casein type primer. Why the use of "brushing lacquer?" Read Mr. Fawkes' article.

The publication CELLULOSE, which was combined with PLASTICS & MOLDED PRODUCTS in March to form PLASTIC PRODUCTS, has just received a postal from the Garden Trading Corporation requesting our sales representative of Velvet Tissue to call. We're still looking for the proper department!

Surprisingly enough, this industry was almost totally unprepared to take advantage of the return of beer. Generally speaking, plastic materials invaded the breweries, bar equipment and accessory houses in spite of the sales effort behind them. They have been making remarkable progress in these outlets, primarily because they are ideal materials to resist corrosion, scuffing, etc. Plywood, covered with sheet stock, produces a light, durable and exceptionally beautiful bar top. Molded materials make excellent coasters, pretzel jars and holders, spigot levers and many other necessary incidentals.

With the arid prohibition sun literally sinking in the west, repeal is hardly a matter of months. Other industrial groups—machinery, glass, steel, wood—are already bringing out new products, designs and applications to benefit from this reestablished market. The plastic industry should do no less. The leading manufacturers are not always the most progressive, but the progressive ones are certainly the real leaders in any industry.

The series of articles begun this Spring by B. S. Covell have met that adverse fortune so common today. The author's indisposition, followed by the extraordinary pressure of business, greatly delayed the manuscript. Substantiation of facts and reference sources have caused a further postponement. A letter from Mr. Covell states that he expects to have the next installment completed for the September issue. In any event, the material will be presented to our impatient readers just as rapidly as possible.

Speaking of things to come, we must hint at a few titles, just to sharpen your appetites. "Nitrate vs. Acetate"—inclusively discussed, in language not too technical, from the research laboratory of one of the best known consulting chemists in the country: "Extrusion Molding as Developed in the United States," by the man who did the developing: "Chromium Plating,—How and When to do it," by the pioneer in this work in the East. And President J. C. Brooks, Fiberloid, has an interesting story for September.

Hungry?

We award an orchid this month, a la Winchell, to:

American Record for their ten cent picture frames—

George Scribner for his energy—

Frank Breyer for his Lacquer Institute—

A. E. Pitcher for his success with material manufacturers—

Harry Dent for his reticence—

New Business, a publication, for their attention to plastics—

and we award a wilted dandelion to:

those in favor of an independent molders association—

The NEMA assistant secretary who, on August 1, didn't know they had a Molders Section!